Patterns in women's health:

exploring gastrointestinal and gynaecological comorbidity

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To Jacinda and Lianah.

My only reasons.

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> "…the setting of limits can easily constrain the vital flows of life, slow down the constructive and strangulate the creative forces of the protective, causing them to become pent up and turn destructively inward, or to release themselves in sudden devastating explosions of uncontrolled vital force…" (Scheid, 2016).

It is only through their assistance that this thesis did not explode with uncontrolled ideas, variables and hypotheses. My thanks also go to Associate Professor Dafna Meron for her detailed instructions on the processes and mathematics of epidemiological research, and to Dr John Bidewell for his critical analysis throughout the construction of this research project. Data analysis was only made possible by the teaching and assistance of statisticians Dr Kingsley Agho and Mr Paul Fahey, whose detailed instruction on the use of SPSS was instrumental to completing this research project. For her critique of mental health measures and descriptions used in this thesis, I thank Mrs Robyn Bowcock, associate lecturer at the Western Sydney University (WSU) School of Nursing and Midwifery. I thank the National Institute of Complementary Medicine (NICM) for kindly offering me a space to work, away from the necessities of clinic. Many thanks also to Julie Partridge for her diligent proof-reading. For assistance in the distribution of the survey, I thank Mrs Georgina Black from China Books Sydney, Mr Tony Chianese from Helio Supply Co. in Sydney, Safflower, EndoActive Australia and New Zealand, the Endometriosis Research Center, the Australian Women's Health Network, Women's Health NSW, and countless individuals and organisations that shared the survey through their online platforms. I dearly thank all those who participated in further interviewing for later stages of this research. The stories I have been told are both harrowing and inspiring. I am inspired. Both in Chinese medicine and biomedicine, we need to do better.

Statement of Authentication

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.

…….

Teja A. Jaensch

Sydney, June 2016

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Abbreviations

ART:	Assisted reproductive technology
Ben:	Root/cause
Biao:	Manifestation/symptom
CPP:	Chronic pelvic pain
CD:	Crohn's disease
CI:	Confidence interval
CM:	Chinese medicine
C-section:	Caesarean section
GI:	Gastrointestinal
GY:	Gynaecological
HBP:	High blood pressure
IBS:	Irritable bowel syndrome
IBD:	Irritable bowel disease
IUD:	Intrauterine device
LI:	Large intestine channel
n=:	Sample number/size
OCP:	Oral contraceptive pill
OR:	Odds ratio
p=:	Probability value
PCOS:	Polycystic ovarian syndrome
PGs:	Prostaglandins
PTNS:	Percutaneous tibial nerve stimulation
PMS:	Premenstrual syndrome/symptoms
PND:	Postnatal depression
RCT:	Randomised controlled trial
RR:	Relative risk
SES:	Socioeconomic status
SIBO:	Small intestinal bacterial overgrowth
ST:	Stomach channel
UC:	Ulcerative colitis
WSU:	Western Sydney University

Abstract:

Background:

Following on from the clinical experience in women's health, the investigator looks beyond the treatment room and into the realm of public health. The comorbidity between gastrointestinal and gynaecological systems appears prevalent in the Chinese medical setting. What follows is an exploratory investigation assessing the extent to which the broader non-clinical community also exhibits this comorbidity. Reviewing the literature and conceptual frameworks, along with piloting a comorbidity correlation study, clear patterns emerged allowing for the development and distribution of the Western Sydney University women's health study.

Methods:

An epidemiological online survey was designed to assess gastrointestinal and gynaecological comorbidity, along with wider implications, in an international cohort of female participants. The four primary research hypotheses were:

1. Gynaecological variables are associated. Dysmenorrhoea is associated with other menstrual phenomena, such as menstrual heaviness and clotting, irregular menses, ovulation pain and premenstrual symptoms.
2. Dysmenorrhoea severity is positively associated with specific gastrointestinal issues (constipation, diarrhoea, bloating, abdominal pain, irritable bowel syndrome, nausea/vomiting, and reflux/heartburn).
3. Gastrointestinal and gynaecological symptoms are associated with infertility, risk of miscarriage, symptoms occurring during gestation, obstetrics interventions and complications, along with postnatal depression and difficulty breastfeeding.
4. There is a positive relationship between gastrointestinal and gynaecological symptom severity and mental health, specifically, increased symptoms are related to increased feelings of anxiety or depression, reduced social activities, and increases in the frequency of individually expressed emotions.

The Western Sydney University women's health study was distributed over two months at the end of 2015 and beginning of 2016. An online survey instrument was designed and approved, and recruitment involved online snow-ball sampling using social media. An international sample (n=2035) of reproductive aged women (18-48 years) participated. General demographic data were collected, along with specific information regarding gastrointestinal, gynaecological, fertility, gestational and obstetric issues, and mental health issues.

Results:

The results show a strong positive association between gastrointestinal and gynaecological variables, along with positive associations with fertility, symptoms of gestation and obstetrics, and mental health.

Gynaecological symptoms were shown to be closely associated with a strong clinical and statistical significance (p=<0.001). For example, dysmenorrhoea severity was associated with irregular menses (OR 10.2, 95% CI 5.8:18.2, p=<0.001), heavy menses

(OR 6.1, 95% CI 3.2:11.5, p=<0.001) and menstrual related migraines (OR 8.2, 95% CI 5.6:12.2, p=<0.001).

Dysmenorrhoea severity was associated with all gastrointestinal symptoms measured in this study, with odds ratios of 2 or more, and strong statistical significance. For example, dysmenorrhea was comorbid with constipation (OR 3.5, 95% CI 2.7:4.6, p=<0.001), bloating (OR 4.9, 95% CI 3.5:6.8, p=<0.001), abdominal pain (OR 4.7, 95% CI 3.5:6.3, p=<0.001), and irritable bowel syndrome (OR 3.3, 95% CI 2:5.5, p=<0.001. Similar patterns were seen when analysing other menstrual symptoms against gastrointestinal symptoms.

Infertility was found to be associated with several variables, such as dysmenorrhoea (OR 1.7, 95% CI 1.3:2.2, p=<0.001), heavy menses (OR 1.4, 95% CI 1.1:1.7, p=0.006), ovulation pain (OR 2.2, 95% CI 1.7:2.9, p=<0.001), constipation (OR 1.4, 95% CI 1.1:1.9, p=0.008), bloating (OR 1.5, 95% CI 1.2:1.9, p=<0.001), and the feelings of grief (OR 1.8, 95% CI 1.3:2.3, p=<0.001). All symptoms of gestation showed relationships with several gastrointestinal and gynaecological symptoms, as did postnatal depression and difficulty breastfeeding. Obstetric complications or interventions were positively associated with several factors, such as dysmenorrhoea (OR 1.9, 95% CI 1.2:3.1, p=0.005), diarrhoea (OR 1.4, 95% CI 1.0:1.9, p=0.05), the use of assisted reproductive technologies (OR 1.6, 95% CI 1.1:2.5, p=0.03), morning sickness (OR 2.7, 95% CI 1.9:3.9, p=<0.001) and difficulty breastfeeding (OR 1.4, 95% CI 1.0:1.9, p=0.04).

The experience of moderate to severe anxiety and/or depression in the previous year was positively associated with many of the variables in the study, such as dysmenorrhoea (OR 2.3, 95% CI 1.5:3.5, p=<0.001), clotty menses (OR 1.9, 95% CI 1.5:2.5, p=<0.001), constipation (OR 2.0, 95% CI 1.7:2.4, p=<0.001), diarrhoea (OR 2.2, 95% CI 1.7:2.8, p=<0.001), bloating (OR 2.9, 95% CI 2.0:2.4, p=<0.001) and IBS (OR 2.1, 95% CI 1.8:2.4, p=<0.001).

Discussion and conclusion:

This study furthers the work of others in highlighting gastrointestinal and gynaecological relationships, revealing complex patterns of comorbidity which extend beyond symptoms of menstruation and digestion and into areas of fertility, gestation, obstetrics, postnatal issues and mental wellbeing. While limited in generalisability due to study design and recruitment, these results are suggested as motivators for interdisciplinary communication and collaboration as a means to improving patient-centred care. Bridging biomedicine with Chinese medicine, comorbidity and pattern differentiation may allow for improved patient-centred care, particularly in women's health. Within CM research into women's health, quantitative research may benefit from multiple outcome measures to assess the total benefit of CM interventions. Future qualitative research aims to go beyond the goal of medicalisation and look upstream—towards prevention. This study furthers the comorbidity hypothesis in women's health, and points the way for further research.

Key words: Chinese medicine, comorbidity, convenience snow-ball sampling, endometriosis, epidemiology, gastrointestinal, gynaecological, swimology, *Yangming Jueyin* axis.

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Study overview:

"How could we fail to 'investigate' the myriad things,
and how can we fail to 'extend' all there is to know?"[1]

What follows is an exploration into women's health, from the *biao* (exterior manifestation) of symptom relationships, to the *ben* (root) of vulnerability and resilience. This exploration follows a meandering path observing the correlation (or comorbidity) of gastrointestinal (GI) and gynaecological (GY) presentations in women's health. Stimulated from clinical observations and treatment results, a pilot epidemiological survey to evaluate the possibility of individually expressed patterns of comorbidity being present in a population of women was created, which showed promising results,[2] and led to the development and testing of the following four hypotheses:

1. Gynaecological variables are associated. Dysmenorrhoea is associated with other menstrual phenomena, such as menstrual heaviness and clotting, irregular menses, ovulation pain and premenstrual symptoms.
2. Dysmenorrhoea severity is positively associated with specific gastrointestinal issues (constipation, diarrhoea, bloating, abdominal pain, irritable bowel syndrome, nausea/vomiting, and reflux/heartburn).
3. Gastrointestinal and gynaecological symptoms are associated with infertility, risk of miscarriage, symptoms occurring during gestation, obstetrics interventions and complications, along with postnatal depression and difficulty breastfeeding.
4. There is a positive relationship between gastrointestinal and gynaecological symptom severity and mental health, specifically, increased symptoms are related to increased feelings of anxiety or depression, reduced social activities, and increases in the frequency of individually expressed emotions.

[1] Cochrane (2016:2) quoting the Ming dynasty physician Yu Chang.
[2] Full data is contained in Appendix A.

A thorough review of relevant literature provided the groundwork for the ethics application and approval of a large survey of an international cohort of reproductive aged (18-48) women—the Western Sydney University (WSU) women's health study. The results, clearly replicating and extending those of the pilot study, reveal extensive patterns of comorbidity in women's health in a community-based sample recruited online, with implications for both medicine and public health.[3]

Dysmenorrhoea severity, was also shown to be related to other menstrual phenomena, such as irregular menses, heavy and clotty menses, ovulation pain, menstrual headaches and migraines, and premenstrual symptoms (PMS). Each of these individual menstrual factors had their own associations with GI variables. Severity of period pain was positively related to the severity of constipation, diarrhoea, bloating, abdominal pain, irritable bowel syndrome (IBS), nausea and/or vomiting, and heartburn/reflux. Due to a large number of women with endometriosis participating in the study, a separate analysis was conducted showing how endometriosis was associated with a greater level of comorbidity than other GY diagnoses. Infertility, symptoms of gestation such as constipation, headaches and migraines, along with birth complications, anxiety/depression, post-natal depression (PND) and difficulty breastfeeding were all associated with dysmenorrhoea severity, along with several GI symptoms. Mental health was adversely impacted by dysmenorrhoea, with increasing pain resulting in greater impacts on social life, less happiness, more anger, depression, fear, sorrow and

[3] Full tabulated results are contained within the body of the thesis or are referred to in Appendix B, and survey questions are listed in Appendix C.

rumination. [4] By treating GI and GY comorbidity appropriately, we may be able to reduce the cascade of further health implications.

This study, proving each of its tested hypotheses, shows how patterns of comorbidity commonly encountered in the clinical setting are present in a community-based sample, indicating an intersection between medicine and public health. These results are limited, however, due to the study design. Non-random and non-probability convenience sampling reduces the generalisability of these results. Further studies on representative samples of reproductive aged women are required to see if the pilot study and the WSU women's health study results are replicated.

While Chinese medicine (CM) has a long and turbulent history, a constant within the epistemology has been *relationships*; whether those of Confucian social order that defined the outer realm, or those between organ systems within the body. Biomedicine has been less hasty to take on such an understanding.

> **Margaret Throsby**: "The body is an amazing thing... you can't really think of the body as organs in isolation from each other... if anybody had ever said; "lungs connected to the gut", you would've said 'excuse me... what are you talking about?"
>
> **Professor Robert Clancy**: "Exactly, I think that's why it's taken so long to get this idea across, there is this connection, the body works as a whole, not as separate entities..."[5]

Perhaps the philosophy of reductionism, and its resultant impacts on practical medicine, lies at the heart of Clancy's observation.[6] However, the term comorbidity (concurrently or sequentially existing morbid conditions) has at least half a century of use within

[4] Mental health is defined as: *a person's condition with regards to their psychological and emotional wellbeing*. http://www.oxforddictionaries.com/

[5] Clancy (2010).

[6] "…[W]estern…reductionist metaphors…[view] *qi* as small particles...[drawing] ona Greek reductionist inheritance…gravitat[ing] towards making concepts into discrete objects or mechanistic components." (Williams & Dutton, 2004:49).

biomedicine. For this present investigation of patterns in women's health, we look very closely at the relationship—or comorbidity—between the GI and GY systems. Since 1989, the impact of this relationship has been discussed by physicians and researchers from the Western tradition, with frequent calls for more understanding and appreciation within practical medicine (and drug administration).

The structure of this thesis is to explore the GI and GY relationship and how its pathology and dysfunction may impact women's lives. Biomedical conceptual frameworks (endocrine, neural, or a combination of both) and CM's historical and present approaches to understanding digestion and reproductive health are discussed, followed by a biomedical literature review, ordered historically. These foundations formed the backbone of the previously conducted pilot study and resultant amendments to the WSU survey design. Sampling and recruitment methods are discussed before a thorough descriptive and inferential analysis of the data. Many issues surface from these results and are discussed. Yet what is the overall purpose? If by showing correlation between systems are we simply paving the way forward for further (poly) pharmacy?[7]

"Integration of pattern classification
with biomedical diagnosis by systems biology
is not only a new direction of personalised medicine development,
but also provides a new drug development model."[8]

[7] See Scheid's (2014) analysis of systems biology using CM as a mine, digging for ideas on polypharmacy. See also van der Greef et al., (2010).

[8] Lu, Bian and Chen (2012:883). Zhao et al., (2012:3509) argue that the modern interest in CM is not directed at validating CM theory and practice, but rather mining the formularies for new drugs for Western markets. See also: Ma et al., (2010), and Lu and Chen (2011).

Does epidemiological research look for social determinants of disease or perpetuate the *medicalisation* (whether it be through drugs or herbs) of everything? These issues are covered further in the discussion, with reference to 'upstream' and 'downstream' medicine.

In the second phase of this research study, survey participants were interviewed in-depth regarding their health and wellbeing. This was a challenge, as usually an interview such as this would result in some sort of intervention, some way of helping, yet here it felt like a simple exploration of women's suffering on the part of the investigator. However, each woman expressed a heartfelt thanks at the end of the interview. They all articulated how talking about their health presented an opportunity for healing; again, at the heart of it is was (and is) a *relationship*.

> "The messy, sticky, distracted business of encountering disorder can engender a multiplicity of resistances and vulnerabilities, which can both allow and impede the clear sight of what 'really' is 'wrong'…"[9]

The conclusion of this paper brings the various threads discussed together and points the way for further quantitative and qualitative research.

[9] Cochrane (2016:1-2).

Background: Gastrointestinal and gynaecological comorbidity:

"Reductionism is about the identification
of basic principles that explain a wide range of phenomena."

John Bidewell.[10]

Women's health conditions are complex and varied, due in part to intricate physiological and pathophysiological pathways, but also to socio-political gender phenomenon that governs medicine and research (Furth, 1999; Hoffman & Tarzian, 2001; Kreeger, 2001; Cochrane, 2015). Women are more likely to engage in preventive healthcare measures (Mogil, 2012; DeCola, 2012) including complementary and alternative therapies (Abercrombie & Learman, 2012), with women utilising more health resources and spending more money overall on health (Cylus, Hartman, Washington, Andrews & Catlin, 2011).

Biomedicine and CM approach women's health from differing perspectives based on alternate ontologies, however, the understanding of comorbidity may act as a bridge between the two. Comorbidity (or multimorbidity) equates to a phenomenon that CM understands as critical to the therapeutic engagement, manifesting through the analytic tool of *bianzheng*—pattern differentiation. Comorbidity has been discussed in biomedical literature since at least the 70s (Feinstein, 1970). Mostly this discussion focussed on certain chronic diseases such as diabetes and cardiovascular disease (Valderas, Starfield, Sibbald, Salisbury, & Roland, 2009; Mangialasche, Marengoni & Kivipelto, 2012), which are concerns that generally relate to an aging population (Ritchie, 2007; Diederichs, Berger &

[10] Private communication, October 2015.

Bartels, 2011), and not specifically to women or their reproductive years (Jackson et al., 2015).

Significant health burdens for women of reproductive age involve the GI and GY systems (Jamieson & Steege, 1996; Mahadevan, 2006; Patel et al., 2006; Graham, James & Keleher, 2008; Rapkin & Winer, 2009; Heinemann, Minh, Heinemann, Lindemann & Filonenko, 2012; Ju, Jones & Mishra, 2014a & b), largely considered to be associated with key times of hormonal change, namely menarche and puberty, gestation and lactation, menopause, and increasingly, medications (Bharadwaj et al., 2014). These can negatively impact the ability to work and study, along with recreation, social life and interpersonal relationships (Heitkemper, Carter, Ameen, Olden, & Cheng, 2002; Chang et al., 2006; Titilayo, Agunbiade, Banjo & Lawani, 2009; Lee, 2010; Rodrigues et al., 2011). Personal anecdotal clinical observations of menarcheal through to menopausal symptoms, along with recent literature, reveal an association between GI and GY complaints, and primary disorders of one system are often mistaken for the other (Longstreth et al., 2006; Munsell, Sonenshine, & Harris, 2010; Bharadwaj, Barber, Graff, & Shen, 2015).

> A 22 year old woman attends clinic with severe nausea, vomiting and abdominal pain for the past year. At that time she began taking the oral contraceptive pill for her dysmenorrhoea. A 33 year old woman attends with post-pill amenorrhoea. She has a paediatric history of chronic constipation, and from menarche had severe dysmenorrhoea. A perimenopausal woman attends clinic presenting with severe menstrual haemorrhaging and severe constipation.[11]

[11] Encounters from the author's personal clinic.

Frequently observed GI symptoms include constipation,[12] diarrhoea, bloating, abdominal pain, reflux, nausea and vomiting, often associated with GY phenomena such as dysmenorrhoea, irregular periods, heavy and clotty periods and premenstrual syndrome (PMS). While general evidence of this relationship exists (Riedl et al., 2008)—discussed below—with a strong covariation in symptoms suggesting a mechanistic physiological commonality (Crowell et al., 1994; Jarrett, Cain, Heitkemper, & Levy, 1996; Heitkemper & Chang, 2009; Hogan, Collins, Baird, & Winter, 2009; Bernstein et al., 2014; Mulak, Taché, & Larauche, 2014), this is rarely considered in terms of treatment (Prior, Wilson and Whorwell, 1989; Alpers, 2008; Valderas et al., 2009; Bharadwaj et al., 2015). It is not known whether the severity of GY symptoms is associated with variations in GI symptoms, nor is it known if a GY phenomenon such as dysmenorrhoea could be a predictor of fertility, miscarriage, gestational, obstetric and mental health issues.

The importance of the GI system and its resident microbiota is increasingly being understood as integral in all aspects of human health (Hunter, 2012), a system that is also suggested to be at the whims of GY hormones and neurology (Mulak et al., 2014; Peng et al., 2014). GI dysfunction can delay menarche (Zacharias, Rand, & Wurtman, 1976; Okoro & Kane, 2009) and lead to menstrual irregularities (Munsell et al., 2010) with specific GI disorders being associated with increased dysmenorrhoea (Bharadwaj et al., 2014).[13] GI

[12] The Rome II criteria is commonly used to diagnose chronic functional constipation: *two or more of the following for at least 12 weeks (not necessarily consecutive) in the preceding 12 months: straining during >25% of bowel movements, hard stool for >25% of bowel movements, sensation of incomplete evacuation for >25% of bowel movements, sensation of anorectal blockage for >25% of bowel movements, manual manoeuvres to facilitate >25% of bowel movements, and/or fewer than three bowel movements per week* (Blaker & Wilkinson, 2010). The more recent Rome III criteria divides IBS into four subtypes: 1. IBS with constipation (IBS-C), 2. IBS with diarrhoea (IBS-D), 3. IBS with diarrhoea and constipation (IBS-M or IBS-A), and 4. Untyped IBS (IBS-U). See Nellesen et al., (2015).

[13] "…in patients with IBS- or IBD comorbid dysmenorrhoea, it may be difficult, due to the co-existence of conditions, to distinguish between an active flare and increased symptom scores during menstruation." (Bharadwaj et al., 2015).

symptoms worsen between ovulation and menstruation (Wald et al., 1981; Heitkemper et al., 1995; Parlak et al., 2003; Munsell et al., 2010; Keller, Sandberg-Lewis, & Siebecker, 2014; Ju et al., 2014a), and can impact fertility and obstetrics (Bradley & Rosen, 2004; Moleski & Choudhary, 2011). For example, metabolic health and diet can impact the composition of follicular fluid and thus embryo quality (Valckx & Leroy, 2015). Several GI and GY associations have been suggested in the literature. Bowel disease can lead to an earlier onset of menopause; Lichtarowicz et al., (1989) found that mean age of menopause of women in their study was two years younger in those with Crohn's disease (CD) than controls, and Longstreth and Yao (2004) found a two-fold increase in hysterectomies in women with IBS.[14] Women seek medical assistance for IBS twice as much as men (Sandler, 1990; Drossman, Whitehead & Camilleri, 1997; Payne, 2004; Herman, Pokkunuri, Brahman & Pimentel, 2010; Bharadwaj et al., 2015) a gender difference noticeable from puberty—thus menarche (Heitkemper & Jarrett, 2008). It has been suggested that 35% of women *without* IBS and 50% of women *with* IBS experience greater GI symptoms with their menses (Altman et al., 2006; Pickett-Blakely, Lee & Mullin, 2010). Bowel disorders are more prevalent after GY surgery (Sperber et al. 2008), with Khoshbaten et al., (2011) finding IBS symptoms in 10-13% of women in the year after tubal ligation or hysterectomy. Conversely, several studies have shown that IBS sufferers are more likely to undergo a hysterectomy (Weber et al. 1995; DiPalma & DiPalma, 2002; Heitkemper & Jarrett, 2008; Pickett-Blakely et al., 2010).

[14] See also: Koch, Palmer, Noordin, Tomlinson and Baidoo (2002) and Okoro and Kane (2009) who find in favour of this hypothesis of earlier and menopause, and Kane and Reddy (2008) who disagree.

While observations of the GI and GY relationship suggest a prevalent women's health comorbidity, the two systems are too often studied as separate entities,[15] thus limiting our understanding of their comorbidty (Altman et al., 2006), along with how this can impact broader issues such as mental health (Bharadwaj et al., 2015). Women with chronic pelvic pain (CPP)—a symptom common to both GI and GY systems (Gökyildiz & Beji, 2012)—suffer a higher incidence of anxiety (Collett, Cordle, Stewart, & Jagger, 1998; Siedentopf & Sillem, 2014; Nellesen et al., 2015). Women are also more likely to be undertreated and improperly treated for their pain; their verbal pain reports are often discounted by their physician, and women are more likely than men to be *sedated* for pain, rather than treated for it (Calderone, 1990; Hoffman & Tarzian, 2001).

> *"They treated me like a drug seeker…They were drug testing me every time I went in, they just didn't believe me…I was going downhill, with one thing after another after another, I couldn't stop it, and everything fell out from under me…"*[16]

Dysmenorrhoea is the most common GY problem affecting women of all races and reproductive ages (Osayande & Mehulic, 2014). At least half of all women suffer or have suffered some level of dysmenorrhoea (Proctor et al., 2002), and the frequency with which it is seen in the CM clinic has made it the primary dependent variable for this study. Smith, Armour and Betts (2014) found that over 89% of acupuncturists in their study commonly treated primary dysmenorrhoea, yet dietary advice was discussed less frequently with patients suffering dysmenorrhoea than other conditions. The WSU women's health

[15] For example, see Nellesen et al., (2015) for a description of IBS being comorbid with other *GI* symptoms such as dyspepsia, reflux and small intestinal bacterial overgrowth (SIBO).

[16] Norah (pseudonym), a survey participant and interviewee describing her journey with severe CPP. Regardless of where a woman is within her reproductive life, from womb to tomb there is a pharmaceutical devised for her, with hormonal treatments such as those cited by this study's survey participants commonly leading to adverse effects (see Zhu & Liu, 2016).

study's hypothesis of GI and GY comorbidity may influence our understanding and resultant treatments and lifestyle advice offered to patients. Improving the understanding of comorbidity in general will lead to improved clinical care and women's health outcomes (Ritchie, 2007; Valderas et al., 2009), and ideally, better communication between CM and biomedical researchers and physicians.

While neither form of medicine can satisfactorily answer all of the problems impacting women's health, biomedical solutions to GY dysfunction accompanies a litany of adverse effects (Proctor et al., 2002), CM is known to benefit women's health, most often related to complaints of the GI or GY systems (Leake & Broderick, 1999; Dean, 2004; Stener-Victorin & Humaidan, 2006; Manheimer et al., 2008; Smith & Cochrane, 2009; Cochrane, Smith, Possamai-Inesedy, 2011; Huang et al., 2011; Cochrane, 2012; Zheng, Zhang, Huang & Wang, 2012; Feng, Stener-Victorin & Chen, 2013; Zheng, Zhang, Wu & Zhang, 2014; Jaensch, 2015c, Jaensch & Cochrane, 2016) with few side effects when prescribed or administered by a qualified practitioner (Kim et al., 2016). A multidisciplinary approach to women's health, specifically covering both visceral and emotional wellbeing (Gökyildiz & Beji, 2012; Siedentopf & Sillem, 2014), which stretches across the biomedical CM divide is required—*bianzheng* or comorbidity could be the bridge that spans this gap.

CM's pharmacopeia houses a plethora of varied treatment options based on individual circumstances (Fu, 1995; Liu, 1998; Bensky, Clavey, & Stoger, 2004; Maciocia, 2005; Zhu et al., 2009), and acupuncture has been both historically and recently shown to be an effective tool for managing GY dysfunction, especially using points on channels related to the GI tract such as *zusanli* ST36 (Helms, 1987; Youn, Kim & Park, 2008; Chen & Chen, 2010; Smith, Crowther, Petrucco, Beilby & Dent, 2011; Han et al., 2012; Zhang & Yang, 2012; Smith et al., 2016). This is hardly surprising considering the pathway of the

Stomach channel, which traverses the abdomen in close proximity to the ovaries (Rogers & Rogers, 1989; Deadman, Al-Khafaji, & Baker, 1998).[17] Interestingly, a modern biomedical approach to treating CPP in women is *percutaneous tibial nerve stimulation* (PTNS), which uses techniques similar to electro-acupuncture:

> "PTNS is a minimally invasive treatment method that leads to decrease in pain severity and improvement in quality of life in women with chronic pelvic pain with effects continuing at 6 months…[A] neuromodulation system was used for stimulation. Frequency was 20 Hz, flow was 200μs wideness and the amplitude of current was between 0.5 and 10 mA. A 34-gauge needle was placed on the point 1 cm posterior and 3 cm proximal to the medial malleolus."[18]

CM has a long history of observing comorbidity between the GI and GY systems in individual cases (Deadman et al., 1998; Bensky et al., 2004), using pattern differentiation such as *Liver Qi Stagnation* (Maciocia, 2005) with *Spleen Qi Deficiency* (Maciocia, 1998; Jǐ, 2016) to determine pathogenesis and treatment. Looking at Fu Qingzhu's understanding of gynaecology,[19] abnormal vaginal discharge is to be treated by strengthening the Stomach and Spleen while regulating the Liver, profuse uterine bleeding is to be treated with herbs to support the Earth, irregular menses require draining of the Liver and watery vaginal discharge prior to menses requires tonification of the Spleen (Fu, 1995:6-48). A descendent of Fu Qingzhu was Liu Fengwu, and many of his GY case histories presented with concurrent GI complaints, such as diarrhoea, dry stools or painful defecation, loss of

[17] It is interesting to note that Chen and Chen (2010) found a point on the Large Intestine channel (*hegu* LI4) to be a superior point to others in the treatment of primary dysmenorrhoea. The Stomach and Large Intestine together are considered as a unit—*Yangming*.

[18] Istek, Ugurlucan, Yasa, Gökyildiz and Yalcin (2014:292). Whilst not acupuncture according to the authors, the point being stimulated is suspiciously close to the location of *sanyinjiao* SP6 which is perhaps the most commonly used point in acupuncture for women's health (Rogers & Rogers, 1989; Deadman et al., 1998; Chen, Chien and Liu, 2013).

[19] Fu Qingzhu (1607-1684) was a scholar-physician who specialised in gynaecology.

appetite, bloating, and nausea (Liu, 1998).[20] Similar to biomedicine, the relationship can be described in several ways through the lens of CM. Perhaps most frequently discussed would be the relationship between Wood (Liver and Gallbladder) and Earth (the Middle Jiao—Spleen and Stomach) within the Five Element system of correspondences (Hicks, Hicks & Mole, 2010).[21] Another approach that clearly describes GI/GY comorbidity is the *Yangming Jueyin Axis*, as described by the Hunyuan school of CM, which illustrates how the inward movement of ingestion and digestion relate to the outward movements of ovulation and menstruation.[22] If patterns of comorbidity exist between the GI and GY systems in communities of women suffering dysmenorrhoea (rather than solely in individual cases),[23] this could potentially help inform the rationale behind intervention and point selection in acupuncture studies (Cochrane et al., 2011). Ideally, it could also demonstrate CM therapeutic rationale to our biomedical peers, thus furthering communication opportunities regarding mutual clients.

There is a clear need for improved patient and physician education to facilitate the provider-patient relationship, as opinions differ on appropriate diagnostic and treatment measures (Heitkemper et al., 2002; Latthe, Mignini, Gray, Hills & Khan, 2006). Mann,

[20] See, for example, cases two and five of premenstrual syndrome (pp.136-138 & 143-146), case two of frequent menses (pp.158-159), case one of functional uterine bleeding (pp.163-165), case three of threatened miscarriage (pp.181-184), cases three and four of infertility (pp.191-193 & 193-196), and case two of endometriosis (pp.213-217). See also Jǐ's (2016) description of the Spleen and Stomach and the role that food, fluids and digestion play in GY issues such as irregular menses and vaginal discharge.

[21] When considering that, according to CM, the Liver regulates menstruation, it is interesting to note that most nutrients, once broken down by the stomach and absorbed into the bloodstream by the small intestine, go directly to the liver for processing (Bolin, 2010).

[22] See Seidman and McLaren (2012), Seidman and Jaensch (2013), Seidman and Revelli (2016 a & b), and Jaensch and Cochrane (2016). The importance of the trigrams of the Yijing, along with Zhang Zhongjing's six levels and Zheng Qinan's description of the Water trigram (describing *yang* concealing into *yin*, not *yang's* dominance over *yin*) are integral to this CM conceptual framework and the resultant approach to treatment. For the philosophical aspects of the Hunyuan approach, specifically the idea of *submerging the dragon*, see Revelli and Georgescu's (2016) fantastic discussion.

[23] It has been found that CM patterns associated with dysmenorrhoea are similar among differing groups of women (Zhu et al., 2009).

Shuster and Moawad (2013) found that nearly 12% of their study sample of young women felt that their biomedical physicians lacked the knowledge and training to manage their conditions, with nearly 10% noting a lack of empathy from their physician.[24] From the patient's perspective, women appreciate a more holistic approach to their healthcare (Alfred & Ried, 2011). While it has been shown that biomedical physicians acknowledge the importance of research evidence in improving patient outcomes (Smith, Coyle, de Lacey & Johnson, 2014), this area seems lacking when faced with interdisciplinary specialities such as gastroenterology and gynaecology (Prior et al., 1989; Weber et al., 1995; Kane, Sable & Hanauer, 1998; Mavani, Kulp & Bachmann, 2002; Alpers, 2008; Valderas et al., 2009; Munsell et al., 2010; Lim et al., 2013), along with the general practitioners who patients would first encounter (Young, Glasziou & Ward, 2002; Callen, Fennell & McIntosh, 2006). This issue is specifically important when considering gendered medicine and comorbidity (Loyd & Murphy, 2012; Mangialashe et al., 2012). A personal clinical bias suggests that women are too often dissected and medicated by disparate specialisations, often leading them to seek alternatives.[25] It is hoped that this present study adds a further rung in the ladder, answering Harlow and Campbell's (2004) call over a decade ago to research the risk factors of menstrual morbidity.[26]

"…labour pain was less severe than my period pain…"[27]

[24] See also: Abercrombie & Learman (2012).
[25] Part two of this investigation involves qualitative interviews with a nested-cohort from within the study sample, which are to be covered in further works. These reveal the disparaging situation facing women in chronic pain, especially those who are eventually diagnosed with endometriosis.
[26] This is done irrespective of Hyde, Parkes, Deeks and Milne's (2000) critique that research appraisal fails to manifest in demonstrable clinical changes.
[27] This from a participant with endometriosis describing her birth experience; to imagine a woman going through pain equal to or greater than labour every month is horrific. That menstrual disorders and their comorbidities are not the priority of the medical research community is a callous disregard for our mothers, sisters, daughters, colleagues, and friends.

> "How, she wondered, did other women…manage? Could it be possible that, while presenting such smiling and contented faces, they were all always on the edge of health? Or was it only she…who felt the strain of what the Reverend…had so often gently and patiently reminded her was a natural thing, an act of God, was almost unbearable?"[28]

Illustrating the existence and extent of these GI and GY comorbidities, and how they impact fertility, gestation, obstetrics, issues postnatally and mental health will contribute to further refine future research in the field of women's health. Both physicians and patients will benefit from this exploration, encouraging a re-evaluation of interdisciplinary diagnoses and treatment decisions. Further communication between specialised medical fields can only benefit patients (Spiller et al., 2007; Bharadwaj et al., 2015). If found to be correlated, GI and GY comorbidity should be considered before prescribing treatment, working as far down the conceptual cascade as possible. The results of this survey may impact both medical education and public health, and highlight the need for better medical and social coping strategies for women in pain:

> "…coping strategies used by the participants were…trying to think of something else (27·8%), praying that the pain will not last long (38·3%), distracting attention by dealing with something else (32·3%), trying to feel better by ignoring pain (17·3%) and trying to heal pain by talking to themselves (16·5%)…"[29]

[28] Larsen (1992:144).
[29] Gökyildiz, Beji, Avcibay and Ozgunen (2013:126).

Biomedical literature review and historical timeline:

To ascertain the current foundation of knowledge in the biomedical literature regarding GI and GY comorbidity, a database search of CINAHL Plus with Full Text (EBSCO) using the terms *comorbidit** and *irritable bowel syndrome* or *dysmenorrhoea* from 1960 to 2016.[30] Of the 382 results, studies of note were then entered into the Web of Science to source citing articles, along with consulting reference lists for related material. Textbooks on gender medicine, along with their citations, were also included in the literature search.[31] Key studies are described below in chronological order and then are discussed and critiqued in order to highlight the gap in current knowledge about comorbidity in women's health.

The earliest reference in the biomedical literature to GI changes at the time of menstruation was found in footnote 2 of Rees and Rhodes (1976) and is dated as 1965, in an article by Mr Pickles and associates. In their inquiry, Rees and Rhodes found of their total (modest) sample (n=67) of 'healthy' women, 64% (n=32) noticed GI changes related to menses, the majority of whom experienced loose stools (48%, n=32), while only 16% experienced constipation (n=11) during menses (thus, not looking at before or after menses). These authors, from the Department of Gastroenterology at the University of Wales, were of the opinion that it was the prostaglandins (PGs) released from the endometrium at the time of menses that caused the GI complaints. Contrast this with the work—just two years later—of Wyman, Heaton, Manning & Wicks (1978:146), who found that, "…in females there were no obvious changes related to the phases of the menstrual

[30] *Comorbidit** was used to find articles mentioning both 'comorbidity' and 'comorbidities'.
[31] It is noted that the review of literature can themselves be a causal element of bias in any study (Lovejoy, Revenson, & France, 2011:4).

cycle." It should be noted that their study had a total of 10 females in their total sample of 20, thus indicating the (likely) possibility of a type II error.

Prior et al. (1989) conducted the seminal study investigating the relationship between GI and GY symptoms.[32] Their retrospective survey (n=798) found that the prevalence of IBS[33] in women attending a GY clinic was 37.3%, compared to 27.7% in those attending controls, who were selected from other non-GY clinics. Of that 37.3%, 50% attended the GY clinic for dysmenorrhea. The authors suggest an association between these body systems, and highlight the difficulty in separating GI and GY diagnoses. The determinants for a woman's referral to a gastroenterologist or a gynaecologist are seen as needing further exploration.[34]

To investigate the GY history of women with IBS, CD or ulcerative colitis (UC), Weber et al. (1995) surveyed 622 women who had been hospitalised for inflammatory bowel disease (IBD) at the Cleveland Clinic Foundation during 1989–1993. More than half reported menstrual abnormalities, dyspareunia and loss of libido. Eighteen percent had undergone a hysterectomy, half of whom were 35 or younger. Highlighting the commonality between GY and IBD symptoms, the authors advise specialist physicians to be familiar with possible concurrent conditions.[35]

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[32] The implication that GI symptoms fluctuated in relation to menses was discussed at least two decades earlier: see footnote two from Rees & Rhodes (1976:475).

[33] IBS has been shown to be a female predominant condition (more than twice that of men, and in particular specifically constipation, nausea, and bloating symptoms), with clinical features of abdominal pain and bowel changes, and is associated with higher rates of non-GI related concerns. As no biomarkers exist for the diagnosis of IBS, the Rome criteria (*recurrent abdominal pain or discomfort for at least three days per month in the last three months that is associated with two or more of the following: improvement with defecation, onset associated with a change in frequency of stool, and/or onset associated with a change in form/appearance of stoo*l (Kilpatrick & Tillisch, 2012)).

[34] See also: Valderas et al., (2009), and see Bernstein et al., (2012) who repeated a similar study to that of Prior and colleagues over twenty years later, finding that women with CD or ulcerative colitis (UC) were more likely to experience diarrhoea during menses.

[35] "Commonly, gynaecologists treat dysmenorrhea with non-steroidal anti-inflammatory agents, which may exacerbate IBD." (Munsell et al., 2010:305). Along with this, how synthetic reproductive hormones could be used to treat or adversely impact IBD and IBS is unknown (Bharadwaj et al., 2015).

Almost a decade on from the Prior et al. (1989) paper, a smaller retrospective study (n=49) compared IBS patients with healthy controls (Kane et al., 1998). Overall, 93% of their sample experienced premenstrual symptoms (PMS), and those with bowel disorders had a cyclic worsening of symptoms. Eighty percent of women experienced digestive symptoms during menses, and menstrual disorders were significantly higher in those with IBS. These results suggest that the menstrual cycle should be considered when investigating bowel disorders, and that GI disorders are important considerations for GY assessment.

Houghton, Jackson, Lea, and Whorwell (2002) measured responses to rectal balloon distension at various stages of the menstrual cycle in a small sample (n=29), finding bowel habits, abdominal pain and bloating were worse during menses. They conclude that IBS is exacerbated during menses, suggesting that this is due to differing responses to hormonal environments.[36] None of their subjects reported chronic GY disorders, which limits the study in the assessment of comorbidity and highlights an area for more research. The hormonal hypothesis was also suggested by Heitkemper and Chang (2009), who see the increase in GI symptoms around menses and early menopause to be reflective of declining or low ovarian hormones, indicating the contribution of oestrogen(s) and progesterone to GI patterns.[37]

Endometriosis (growth of endometrial tissue outside of the uterus) presents primarily with severe dysmenorrhea, and bowel dysfunction is a common comorbidity. Maroun, Cooper, Reid and Keirse (2009) conducted an exploratory case series, observing

[36] See also: Hogan, Collins, Baird, and Winter (2009) and Mulak et al., (2014).
[37] See also: Bharadwaj et al., (2015:188) who state that "…many women…reported an increase in IBS symptoms around the onset of menopause…". The reference they use to support this assertion, however, is the literature review by Adeyemo, Spiegel and Chang (2010), who found insufficient data to assess the impact of menopause on IBS.

women undergoing laparoscopic investigation for endometriosis (n=355), finding that 90% of confirmed cases also reported GI symptoms. Eighty-four percent of women without endometriosis but with IBS also suffered dysmenorrhoea. Three years later, Issa et al., (2012) combined the strategies of Houghton et al., (2002) and Maroun et al., (2009) to test their hypothesis of *visceral hypersensitivity*.[38] As earlier works had shown an association between endometriosis and IBS (Seaman, Ballard, Wright & De Vries, 2008; Meurs-Szojda, Mijatovic, Felt-Bersma & Hompes, 2011), Issa et al., (2012) used rectal sensitivity testing, where a "…flaccid barostat bag was placed in the rectum…" (p.378) of women attending a GY clinic for laparoscopic investigation. They found that minimal to mild and moderate to severe endometriosis was associated with a higher prevalence of IBS symptoms. Rather than endometriosis being the primary irritant leading to IBS, the authors suggest visceral hypersensitivity as the determinant in endometriosis pain severity.[39]

Earlier observational studies (Prior et al., 1989; Kane et al., 1998) used retrospective methods to ascertain the relationship between GI and GY symptoms. The validity of retrospective studies was critiqued by Lim et al. (2013), who conducted a prospective study using questionnaires and diaries to monitor patients with IBD (n=47) and 'healthy' controls (n= 44) over one menstrual cycle. While both groups reported feeling worse during menses, IBD patients were more likely to suffer PMS (79%) than the controls (50%). The authors conclude their study by stating "The menstrual cycle is often overlooked, although it can be a confounding variable in [bowel] disease activity…" (Lim

[38] See Camilleri, Coulie and Tack (2001) and Andresen (2009) for more on visceral hypersensitivity.
[39] Lea, Bancroft and Whorwell (2004) found that women with endometriosis showed a 50% increased risk of developing IBD.

et al., 2013:55). While a prospective study, observing one menstrual cycle may not provide enough data to be suitably reliable.

A retrospective survey of healthy women (n=156) who attended an outpatient GY clinic investigated GI symptoms occurring premenstrually or during menses (Bernstein et al., 2014). Seventy-three percent of their sample experienced GI symptoms either before or during menses, abdominal pain and diarrhoea being the most common. An underlying functional intersection between GI tissues and reproductive hormonal pathways is suggested, however "[t]here has been little work to examine potential [physiological] predictors of GI symptoms in relation to menses." (p.5). Their study is weakened through a lack of data regarding GI symptoms at other times in the menstrual cycle, and that there are no indicators of pain severity.

Peng et al. (2014) took a different approach to earlier studies, and instead of investigating along the lines of the hormonal hypothesis, used an animal model to test if the GI/GY relationship was influenced by neural pathways. By irritating the lower uterine horn of anesthetised rats with mustard oil they showed clear provocation of colonic hypermobility. They conclude their paper by stating "The comorbidity of GY/obstetrical and GI problems is not coincidental but rather causal in nature…" (p.436).

Thus far there have been both observational and intervention strategies used to assess the GI/GY relationships. Observational studies have used both retrospective and prospective methods, while intervention studies (on humans) have used laparoscopic investigations or rectal balloon distention, and (on animals) direct uterine irritation. It could be argued that using a rectal balloon or mustard oil irritation in such studies of women's health is a methodological product of a patriarchal ideology in science and medicine. This is an area further explored qualitatively in part two of this project.

While these papers all show an association between GI and GY conditions, they cover the topic regarding symptomatology quite generally and utilise narrow samples from morbid populations. These studies could have been improved through greater assessment of GI or GY medications confounding results (Bharadwaj et al., 2015). More in-depth work is needed to explore specific patterns and indicators of comorbidity in community samples, and how patterns may extend beyond the narrow definitions of menstrual and digestive complaints and impact other areas such as fertility, risk of miscarriage, symptoms of gestation, obstetrics, postnatal and mental health. An example of this present study's attempts at understanding these complicated associations is our exploration of the variables associated with breastfeeding difficulty. A key issue in the postnatal period, for both mother and child, is breastfeeding. The predictors of breastfeeding success are poorly understood. Menstruum is associated with breastmilk in classical CM (Furth, 1999; Wu, 2010), thus dysmenorrhoea—the primary variable in the WSU women's health study—was evaluated in regards to breastfeeding difficulty. Another example is our analysis of those women reporting obstetric complications or interventions and associated variables, including both GI, GY and mental health factors. Further, if we were to show that multiple menstrual measures are associated, this could then inform improved outcome measures in future CM trials.

Methodological limitations of previous studies indicate that recalling symptoms tends to be easier than recalling quality of life (Schmier & Halpern, 2004), so a future observational survey design exploring specific symptom patterns is warranted. This would then allow exploration of the relationships between specific GI and GY symptoms. The major issue for all of the papers reviewed is sampling. Using probability sampling of hospital or clinic samples can create a selection bias, as "…disease clusters…[appear] more

frequently in patients seeking care than in the general population." (Valderas et al., 2009:360).[40] This present study employs the reliable tool of *patient reported health outcomes* (Appleby, 2012) on a community-based sample to assess GI and GY comorbidity; "[m]ore research into patients' perspectives on the ways in which multiple conditions affect their health…is needed to…ensure that care is truly patient centered." (Valderas et al., 2009:363). Collett et al., (1998) found that women with pelvic pain were more likely to experience anxiety than those without pain, so questions on mental health warrant inclusion in further GI and GY observational research.[41]

"…most modern theories of female inferiority have used biology to support their case…
it is about biology determining women's body as weakness via menstruation,
the toll of reproduction, or female emotionality."[42]

[40] See also: Berkson (1946).
[41] It is noted that while fundamentally different, anxiety and depression are seen together in approximately 50% of cases (Hendriksen, 2016), and women with CPP being particularly vulnerable to both (Rosenthal, Ling, Rosenthal and McNeeley, 1984; Latthe et al., 2006; Mellado et al., 2006; Daniels & Khan, 2010; Abercombie & Learnman, 2012; Gökyildiz et al., 2013; Siedentopf & Sillen, 2014; Nellesen et al., 2015), with the general use (rather than specifically diagnosed and differentiated states) of the mental health terms being used in literature (Graff, Walker & Bernstein, 2010; Bharadwaj et al., 2015).
[42] Furth and Cochrane (2006:5).

Gastrointestinal and gynaecological comorbidity: Conceptual frameworks.

"What a piece of work is [wo]man,
how noble in reason, how infinite in faculties,
in form and moving how express and admirable, in action how like an angel,
in apprehension how like a god[dess]…"

Hamlet, Act 2, Scene 2[43]

The conceptual frameworks used to assess the GI/GY relationships from the biomedical perspective are the hormonal hypothesis, the neural hypothesis and the neuroendocrine hypothesis. All of which find an outcome measure upon which to cease their investigation. For example, it has been shown that GI symptoms fluctuate with the menstrual cycle, and as the menstrual cycle is heavily influenced by the fluctuations of reproductive hormones such as oestrogen and progesterone, these are then seen as the primary irritants of the GI system. The actual role and impact these hormones have on the GI tract is debated in the literature, with some studies finding increased GI motility in the luteal phase and others finding reduced motility (Wald et al., 1981; Simmons, Heitkemper & Shaver, 1988; Kamm, Farthing & Lennard-Jones, 1989; Hinds, Stoney & Wald, 1989; Bharawaj et al., 2015).[44]

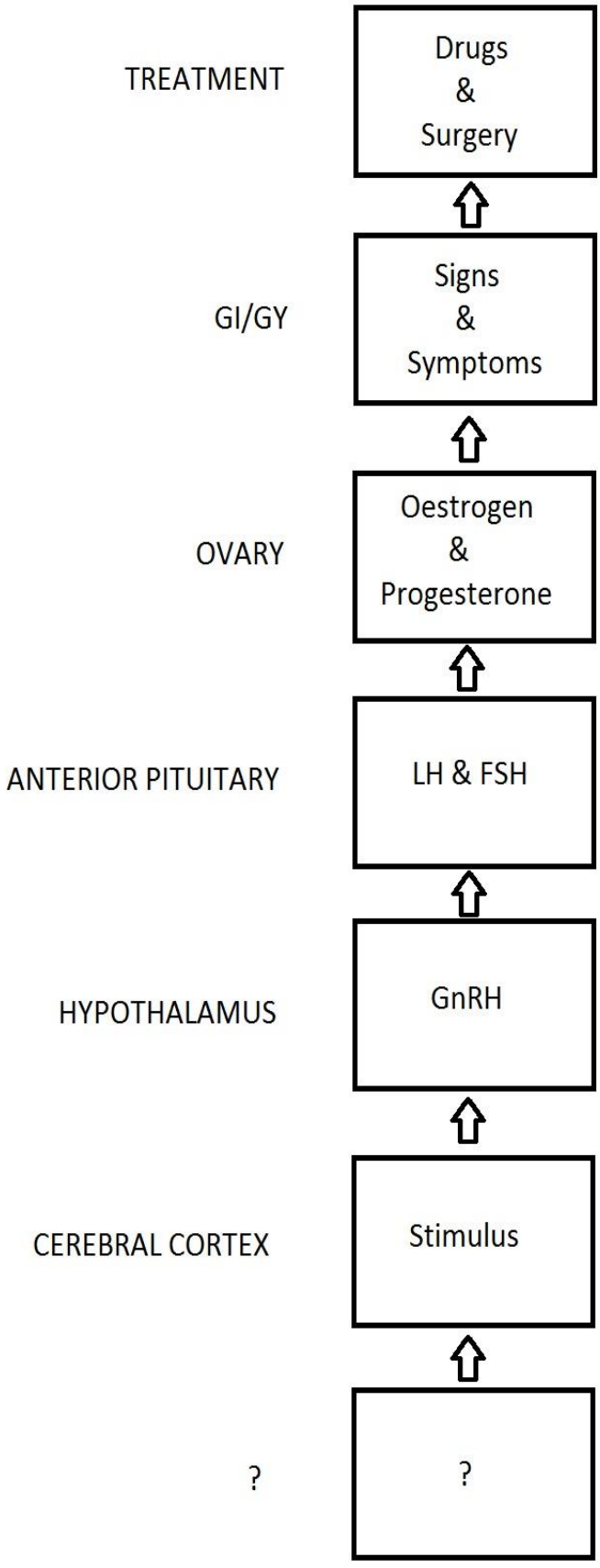
Using a different framework, direct irritation of the endometrium has been shown to cause changes in GI motility, suggesting a *causal* neural pathway of morbidity, a phenomena described as neural cross-talk (Pezzone, Liang & Fraser, 2005). These interactions are discussed as cross-system, viscero-visceral relationships (Berkley, 2005:272), which may be influenced by immune system pathways (De Leo, Tawfik &

[43] Shakespeare (1564-1616). See Raffel (2003:110).
[44] See also: Rees and Rhodes (1976), Turnbull et al., (1989), Whitehead et al., (1990), Bovo et al., (1992), and Degen and Phillips (1996).

LaCroix-Fralish, 2006; Scholz & Woolf, 2007; Mogil, 2012). Further ideas link the two systems—neurology and endocrinology—and suggest neuroendocrine phenomenon are at play (McEwen et al., 2012:4). Finally, PGs associated with menstrual cramps have been suggested as the key irritant of the GI tract (Parlak et al., 2003), however "[i]t is unclear whether PGs released from the uterine muscle gain access to the systemic circulation…" (Bharadwaj et al., 2015:186). PGs, particularly PGE2 (a notorious feature of endometriosis) are on a vicious cycle with oestrogen, which increases the production of enzymes that produce PGs (Wu, Shoji, Chuang & Tsai, 2007; Rosser, 2016). PGs are thus really an extension—a *biao*—of the hormonal hypothesis of women's suffering. By considering the following hormonal conceptual framework (Graph 1), articulating a causal feature of comorbidity becomes problematic.[45]

[45] This casual diagram has been inverted here, to see the end point of women's health interventions first, and then how far down the medical inquiry the physician (and sphere of medicine) travelled to come to an understanding of 'cause'.

Graph 1. Hormonal hypothesis conceptual framework



Other menstrual related symptoms, such as headaches and migraines, have also been discussed using the hormonal hypothesis. Headaches and migraines have been shown to be two to three times more prevalent in women (Manzoni & Stovner, 2010; Waldenlind, 2012). While oestrogen and progesterone (following the hormonal hypothesis of female suffering) are the primary factors discussed in the literature, with arguments continuing about oestrogen or progesterone insufficiency being causative, other factors may be the hypothalamic-pituitary-adrenal axis, neurotransmitters (such as noradrenaline, serotonin and dopamine), magnesium, platelet homeostasis, PGs and trigeminal nociception sensitivity due to the oestrous cycle (Nappi & Berga, 2010). Clinicians have observed menstrual-related migraines as being more severe, long-standing and refractory compared to non-menstrual migraines (Silberstein, 1997; Stewart, Lipton, Chee, Sawyer & Silberstein, 2000; Curtis et al., 2002; MacGregor & Hackshaw, 2004).

Depending on where the clinical investigation ceases on this flow-chart (Graph 1) will depend on what medical intervention is employed. Where should the medical investigation—by those who make "…their living by attending to the physical woes of others..."—cease?[46] From the physician's perspective, action must be taken at some point. From the patient's perspective, this action must be based on the best evidence available. This from Karen (pseudonym), a respondent to the survey distributed in this present study who participated in a further qualitative interview, discussing her endometriosis:

"It's ridiculous. We don't really have treatment,
it's just hormones given to you in various ways, but it doesn't work.
Or they just cut bits out of you."

[46] Quoted from Brown (2015:13).

When the medical hypothesis is based on oestrogen and progesterone, then the treatment will be hormonal replacement or manipulation. Yet basing a hypothesis on the end point of a cascade of internal events reveals an inherent flaw in the application of reductionism. As stated by Bidewell above, if we are truly practicing reductionism we are seeking the underlying principle, not the details.

> "…therapy relied on the concept of a notoriously deficient female body, one which could be regulated [or manipulated] through the activation of efficient chemical messengers produced in the ovaries…The concepts of internal secretion and endocrine regulation generated a version of femininity as delicate, precarious and never resilient."[47]

Not surprisingly, the actual role and impact of oestrogen and progesterone are debated in the literature,[48] and whether it is the hormone itself or its receptor that is responsible (Mohammed et al., 2015; Weber, 2016). Heitkemper and Jarrett (1992) showed how women with functional bowel disorders experienced greater GI symptoms at menses than controls, however there were no differences between group serum hormone levels. The cerebral cortex reacts to either internal or external stressors, thus initiating the resultant cascade (Juster & Lupien, 2012:78). How well the cerebral cortex can respond to changes in the internal and external environment may be determined by our biology along with our sociology.[49] Visceral pain has been shown to be deeply influenced by stress (Daniels & Khan, 2010; Benson et al., 2014; Moloney, O'Mahony, Dinan & Cryan, 2015; Moloney, Stilling, Dinan & Cryan, 2015), particularly chronic stress and allostatic load (Michaud,

[47] Stoff (2014:24).
[48] See, for example: Riley, Robinson, Wise and Price (1999), Craft (2003), Kuba and Quinones-Jenab (2005), Craft (2007), Fillingim, King, Ribeiro-Dasilva, Rahim-Williams, and Riley (2009), Manson (2010), and Mogil (2012).
[49] See, for example: Sternberg (1999), Rannestad, Eikeland, Helland and Qvarnström (2000:897), Jackson, Iezzi, Gunderson, Nagasaka and Fritch (2002), Butkevich and Vershinina (2003), Jones, Zachariae and Arendt-Nielsen (2003), Sternberg and Ridgway (2003), Edwards, Haythornthwaite, Sullivan and Fillingim (2004), Keogh and Eccleston (2006), Butkevich, Barr and Vershinina (2007), Langford et al., (2010), Langford et al., (2011). Bruehl, Burns, Chung and Chont (2009), and Fillingim (2013).

Matheson, Kelly & Anisman, 2008). So where does the medical inquiry stop? Eventually something must be done to help the patient. For both biomedicine and CM, where the medical investigation ceases is basis for the application of medication.[50]

Despite almost three decades of literature on GI and GY comorbidity, its understanding is not revealed in treatment, with each system being approached separately by disparate specialisations (Hollier et al., 2015). Loyd and Murphy (2012:181) discuss the need for physicians, who are supposedly practicing evidence based medicine, to consult the research literature prior to making treatment decisions, especially regarding gender medicine. This is taken further by Mangialasche et al., (2012) to include comorbidity or multimorbidity; "…multimorbidity requires a holistic approach and continuous collaboration across specialties and over professional and organizational boundaries, including both medical care and social services." (p.493).[51] However, as shown by Hyde, Parkes, Deeks and Milne (2000), it seems unclear whether the critical appraisal of research results in demonstrable impacts and practical significance on decision making, patient health and satisfaction.

[50] These themes, along with divisions in epidemiology and medicine—specifically *upstream* and *downstream* medicine—will be discussed in stage two of this research project.
[51] See also Daniels & Khan (2010).

Pilot study: Stepping outside the clinic.

After over a decade in private practice with a special interest in women's health, a consistent theme emerged from the demographic of reproductive aged women in the Hills District of Western Sydney: there is a preponderance of menstrual and fertility disorders complicated by those of the GI tract. Obvious patterns are prevalent in the CM tradition that allow for seamless analysis and thus treatment of these comorbid states, however, this was not reflected in how patients were being assessed and treated by our biomedical peers, particularly those specialising in gynaecology and gastroenterology. Too often women reported that they sought alternatives to their previous medical options due to being (mis)treated in a disparate way by isolated specialities. This case was used to illustrate the problem at the 2014 Hunyuan Huaixuan Medical Congress in New York:

> Jennifer (pseudonym) presented in clinic with flooding periods and severe constipation. Being 45 years old, she was told by her GP that these were signs of perimenopause. Her gynaecologist was recommending a hysterectomy while her gastroenterologist was offering both oral and anal laxatives, and neither the GP, gynaecologist nor gastroenterologist had ever discussed her case as a team. Jennifer was intensely distressed by her predicament. Heavy periods and constipation had been part of her history for many years, but not to this extent. She was thin, thirsty and dry. Stools were hard, infrequent and caused rectal bleeding. Her menstrual flow was both heavy and clotty, but without pain. At the time of seeing her she had been bleeding consistently for the previous three weeks. She was drained and anaemic, found it difficult to sleep and felt continually flushed. Desperate, Jennifer had booked the hysterectomy, but had attended clinic at the behest of her daughter, who had personally had good results with CM.[52]

[52] While specific CM treatment(s) are not the focus of this thesis, treatment with herbs and acupuncture specific to the *Yangming Jueyin Axis* were prescribed, along with *Xinfa*—the Heart method—(Seidman & Jaensch, 2013; Jaensch, 2014) proved successful, and Jennifer cancelled her surgery. Both the construct of this approach to CM analysis, and the treatments derived from it, are appealing. Particularly as it emphasises that there is one *yin* and one *yang* for the human being; one *taiji*. Thus, in a way it returns to a view of the body described by Furth (1999) as the 'Yellow Emperor's body', before medicine for women was considered difficult, troublesome, and requiring the 'different formulae' from Sun Simiao onwards. See Wu (2010:41:45) for a description on how this difference was highlighted by Sun Simiao in his *Essential Prescriptions Worth a Thousand Golds for Managing Urgent Situations* (651 BCE) and then changed to an understanding of male and female illnesses being fundamentally the same in the *Imperial Compiled Golden Mirror of Medical Learning* (1742 BCE). These issues, along with contemporary gendered medicine, are discussed in further detail in the qualitative aspect which comprises part two of this project.

It could be argued that our anecdotal experience was not sufficient to necessitate further investigation, there were indications, however, that this particular pattern, along with the broader picture of women's health required further scrutiny:

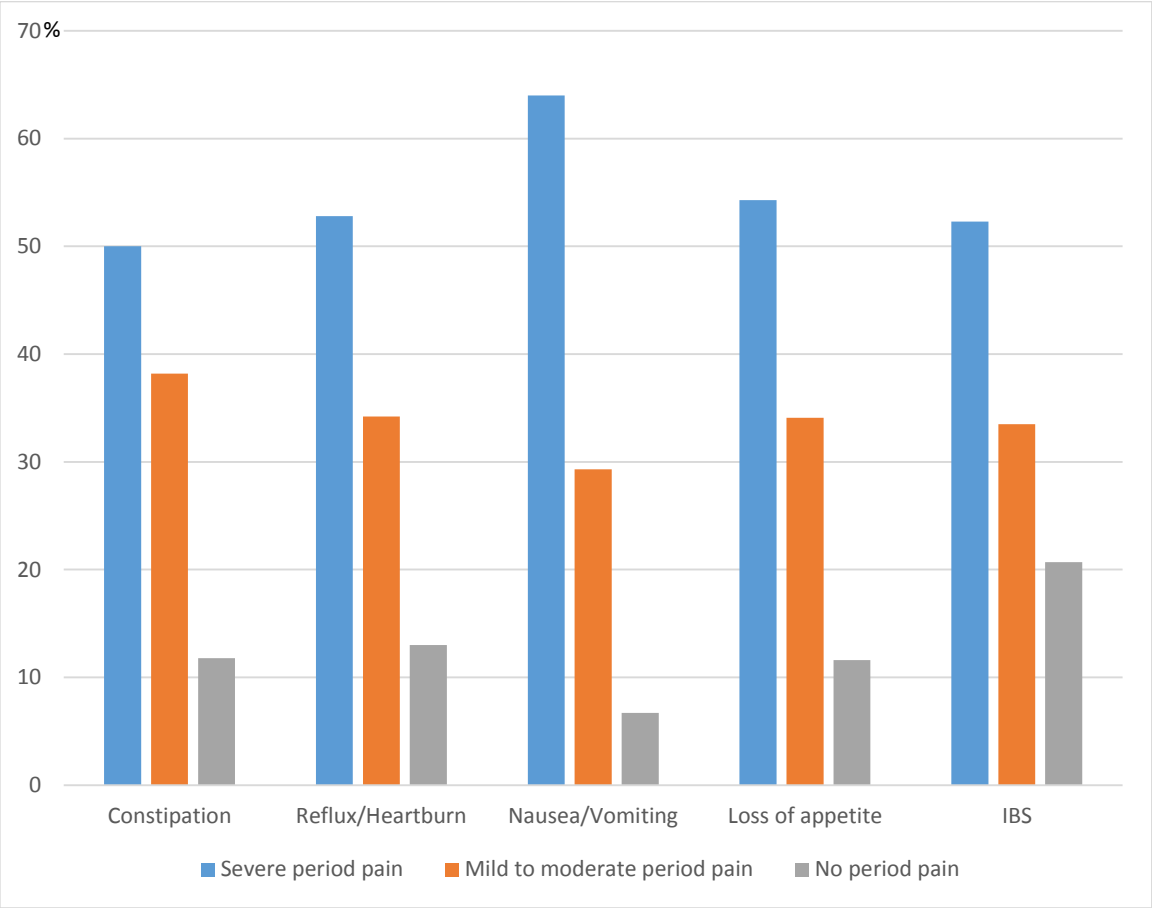
> "…women struggle with the lack of information available to them and to their social network. Another frustration was the lack of knowledge among medical professionals about the disease and its emotional and psychological effects…[W]omen also said they did not feel in control of their lives, particularly in making medical decisions, and found it difficult to be assertive in communicating with healthcare professionals…[They] experience a wide range of negative psychological experiences, such as mental fatigue, stress, depression, crying, and problems with sleep…[which] can further exacerbate women's pain, which in turn can consume a woman's life, reduce her self-esteem, and rob her of her sense of control…Women's attitudes toward menstruation can be influenced by culture, society, and personal experiences; which can affect self-image and body satisfaction… and cause women to feel disconnected from one another…If women have negative attitudes toward menstruation, they will more likely have negative experiences with menstruation, and vice versa."[53]

Seeing a prevalence within our own population of patients, we sought to explore the possibility of the GI and GY comorbidity as phenomenon lived by a larger community. A pilot study testing this hypothesis was devised and implemented over three months (February to April, 2014), asking respondents (n=471) to rate the severity of their GI and GY symptomatology. The results were promising, showing a clear linear relationship between systems (Graph 2).[54]

[53] Barnack and Chrisler (2007:118-119). See also Rosenthal et al., (1984), Cox, Henderson, Andersen, Cagliarini and Ski (2003), Hoerster, Chrisler, and Rose (2003), and Stubbs & Costos, (2004). For the relationship between dysmenorrhoea and insomnia, see Woosley and Lichstein (2014).

[54] The study recruited 471 women who responded to GI and GY questions. Tables and graphs from this study are included in Appendix A. A strong association was found and warranted a larger study for result replication before any confident statements could be made (see below).

Graph 2. Pilot study data: Dysmenorrhoea severity and associated GI symptoms



*This Graph is taken from the comorbidity pilot study data, see Appendix A.

Based on the literature and previous study designs, clinical experience and the pilot study results warranted a larger epidemiological community-based survey of reproductive aged women to examine if results could be replicated in a larger study, and to further explore the relationships between GY and GI comorbidity. GI symptoms have been shown to worsen between ovulation and menstruation (Parlak et al., 2003; Munsell et al., 2010; Keller et al., 2014). While the pilot study was not designed to test cyclical changes in GI symptoms, the WSU women's health study took this into account, along with possible confounding due to pain medications.

Western Sydney University women's health study:

Research hypotheses:

The aim of this research is to add to existing knowledge about GI/GY comorbidity, specifically if symptom severity of one system increases the likelihood of symptoms in the other, and if these symptoms impact fertility, gestation, obstetrics and mental health. Whether women with severe GY phenomena suffer more GI symptoms, infertility and gestational issues than those who suffer moderately, mildly, or not at all, has not yet been established. The quantitative research hypotheses broadly address coexisting patterns in women's GI, GY and general health. This study hypothesises that there is a *positive* association between period pain severity and experiences of GI symptom severity, such as constipation and diarrhoea. The null hypothesis is that the severity of period pain has no association to the presence of GI symptoms. Subsequent hypotheses are that if present, this comorbidity will impact women's mental health, fertility and symptoms of gestation and obstetrics. The four specific hypotheses tested in this study are:

1. Gynaecological variables are associated. Dysmenorrhoea is associated with other menstrual phenomena, such as menstrual heaviness and clotting, irregular menses, ovulation pain and premenstrual symptoms.
2. Dysmenorrhoea severity is positively associated with specific gastrointestinal issues (constipation, diarrhoea, bloating, abdominal pain, irritable bowel syndrome, nausea/vomiting, and reflux/heartburn).
3. Gastrointestinal and gynaecological symptoms are associated with infertility, risk of miscarriage, symptoms occurring during gestation, obstetrics interventions and complications, along with postnatal depression and difficulty breastfeeding.
4. There is a positive relationship between gastrointestinal and gynaecological symptom severity and mental health, specifically, increased symptoms are related to increased feelings of anxiety or depression, reduced social activities, and increases in the frequency of individually expressed emotions.

Aims and objectives:

Current knowledge regarding the relationship between GI and GY phenomena is limited to general observations of association. Missing is the specific symptom data, to allow physicians and patients to understand symptom relationships and the impact medical decisions may have on other systems. This survey data will deconstruct the broad term of 'IBS' and analyse specific GI symptoms in relation to those of the GY system.

Dysmenorrhoea severity will be directly compared to frequency and severity of constipation and diarrhoea (accounting for medications as confounders), bloating, abdominal pain (which can be a symptom of either/or neither body system), nausea/vomiting and reflux/heartburn. Dysmenorrhoea as a single dependent variable can also then be compared to other GY phenomena such as menstrual irregularity, heaviness, clotting, ovulation pain, PMS, menstrual headaches/migraines, GY diagnoses and surgeries, infertility, use of pain medication, surgery, emotional wellbeing, and obstetric issues such as morning sickness, miscarriage, and birth interventions/complications. Self-selecting respondents in this non-experimental investigation will be categorised into groups of dysmenorrhoea severity, and their responses to GI symptoms will be compared. As the same limited data is required from a large sample, with limited time and financial resources, an explanatory and predictive survey is the most appropriate design for this investigation.

Grouping GI symptoms together into categories such as IBS, as seen in the literature, may limit our understanding of the finer details of the comorbidity. This study has been designed to allow specific analysis of symptoms (and confounding by medications), looking for patterns of comorbidity in women's health. Women with GY

dysfunction are burdened with a reduced quality of life during menses, a situation which then continues throughout her cycle via GI dysfunction. Highlighting comorbidity in women's health, particularly the hardship borne by those with GY and GI symptoms, is a key aim of this study.

Method and design:

A prospective online epidemiological women's health observational survey was designed and distributed (Western Sydney Human Ethics Committee approval number H11434) over 2 months.[55] This anonymous, non-experimental design collected information from self-selecting respondents using naturalistic convenience non-probability community snow-ball sampling. Women were asked to share the survey amongst family, friends and their social networks, leading to a rapid response rate and sample saturation. Questions are generally based on the Australian Longitudinal Study on Women's Health survey (Women's Health Australia, 2015), in the hopes of future data comparison. Survey structure (using SurveyMonkey) incorporated closed (using ordinal scales) and open-ended questions, collecting demographic data on GI and GY symptom severity and frequency, medications and surgeries, fertility and gestation, along with mental health issues.

[55] Survey collection began on the 14th of December, 2015, and concluded on the 15th of February, 2016.

Questions, definitions and measures:

The complete survey is attached in Appendix C. Nominal data was used to collect the majority of demographic information, with ordinal scales used for all other measures. Symptom severity was measured as 'none', 'mild', 'moderate' and 'severe'. These were dichotomised in various ways for data analysis, and full details are either included in the results below or referenced in Appendix B. Symptom frequency was measured in various ways depending on the variable, for example, menstrual related frequencies were measured as occurring in '1 out of 6 cycles' through to '6 out of 6 cycles', while constipation frequency was measured as 'daily', 'weekly', 'monthly' or 'unpredictable'. As the works discussed in the literature review above did not assess the use of medications in their analyses, the use of pain medications was queried in the survey, to avoid its confounding the physiological impact of dysmenorrhoea severity on GI complaints.

Dysmenorrhoea was changed to 'period pain' for better participant comprehension, and while most questions were straight-forward, several definitions were given to survey participants to avoid confusion and allow for better comprehension from international respondents, which are included in the glossary. While it could be argued that some of the broader areas of women's health investigated in this study should be excluded from this type of research to allow a specific focus on GI/GY symptoms, they are included to open the investigation up to all four of the listed hypotheses and allow for suggestions of incipient cascades of vulnerability.[56] Mental health measures such as anxiety, depression

[56] For example, birth has become an incredibly medicalised process largely taken out of the hands of women (private communication with childbirth advocate and doula Jacinda Jaensch, 2004-present). See also Smith, Collins, Crowther and Levett (2011).

and PND were based on participant's self-assessment and not on clinical diagnostic criterion.

Recruitment:

Social media, predominately Facebook, but also Instagram, Twitter and LinkedIn, were used successfully to collect our sample. Precedent exists for using social media, such as Facebook, to promote health surveys and gather samples (Close, Smaldone, Fennoy, Reame & Grey, 2013; Mishra et al. 2014; Kayrouz, Dear, Karin & Titov, 2016; Pedersen & Kurz, 2016),[57] with successful enrolment of women similar in demographics to the broader population (Loxton et al., 2015), along with ethnic minorities (Ince, Cuijpers, van't Hof & Riper, 2014). Similarly designed studies include specific inquiries into GY matters (Harris, Loxton, Wigginton & Lucke, 2015; Rowlands, Loxton, Dobson & Mishra, 2015) and pain (Merolli, Gray, Martin-Sanchez & Lopez-Campos, 2015). It is suggested that over 40% of women utilise the internet for health information, especially those who feel stigmatised by their health condition (Rowlands et al., 2015). Women's health groups, especially those associated with endometriosis and polycystic ovarian syndrome (PCOS), were integral in obtaining the sample in the time-frame required. The large number of respondents with endometriosis allowed for a specific analysis on this disease. This is due to the assistance with survey promotion and distribution by groups such as the Endometriosis Research Centre in the United States, and EndoActive Australia and New Zealand.

[57] See also: Berry and Bass (2012), Ramo and Prochaska (2012), Batterham (2014), Nelson, Hughes, Oakes, Pankow and Kulasingam (2014), Nolte, Shauver, and Chung (2015), Lammert, Comerford, Love and Bailey (2015) and Koenings, Martin-Biggers and Byrd-Bredbenner (2015).

Participants and sampling:

Naturalistic convenience, non-probability, self-selecting online snow-ball sampling was used, with the inclusion criteria being gender (female) and age (18-48). The research design allowed for three months of active data collection to obtain a sample of at least 2,000 respondents. After only two months 2,130 participants had responded, with 2,035 included in the analysis after excluding males, those identifying as gender neutral, and women aged under 18 or over 48. The survey took between 10 to 15 minutes to complete.

Data analysis:

The raw survey data file was imported from SurveyMonkey into IBM SPSS (v.22) to conduct all analyses. Descriptive frequency statistics were computed for the demographic variables of three age ranges (18-28, 29-38, 39-48), employment status, country of birth, country of residency, ethnicity, housing, education and relationship status. These results were used both to describe our recruited sample and to assess for possible confounding. Sample frequencies for all symptom variables (severity and frequency) were tabulated, and those not included in the results section of this thesis are referred to in Appendix B. Cross-tabulation of key variables using the Pearson Chi-square test, along with binary logistical regression was used to compare dichotomised variables (dichotomised as either 'yes/no' or 'none and mild/moderate and severe) using odds rations (OR) or relative risks (RR) with confidence intervals (CI) and probability values (p=). One-Way ANOVA and Tukey HSD post-hoc was used to assess differences between age groups regarding menarche. All results that were clinically significant (p=<0.05) are either discussed below or included in

Appendix B. These inferential statistics were used to assess the association between GI and GY symptoms, and how these systems impacted other health factors in the sample. Free-text comments, while not statistically analysed,[58] were utilised in framing and exploring individual cases in the qualitative interviews that form future directions for this research.

Data analysis compares variable groups using inferential statistics, exploring the hypothesis of GI and GY comorbidity, along with further hypotheses relating to GI and GY impacts on fertility, gestation and obstetrics, and mental health. Firstly, the independent variable of dysmenorrhoea was explored in relation to other menstrual factors. Then dysmenorrhoea severity is correlated with GI symptoms. Following is an analysis of dysmenorrhea severity and infertility, symptoms of gestation, obstetric interventions or complications, and postnatal issues. Mental health is then assessed in relation to dysmenorrhoea, before demographic variables are explored as confounders or effect measure modifiers.

[58] This usefulness of free-text comments is discussed in detail by Rich, Chojenta and Loxton (2013:1), who find that they "…are a valuable data source, suitable for content, thematic and narrative analysis…".

Results:

The survey took place over a two-month period (14th of December, 2015 to the 8th of February, 2016), and a total of 2,130 participants engaged in the survey. The sample population available for analysis was 2,035, this excluded 95 participants who were found to not meet the study inclusion criteria (see Table 1). After inclusion of 2,035 women starting the study, there were 1567 participants remaining at the end of the survey, indicating a 23% overall attrition. This attrition was gradual throughout the survey, mostly due to technological difficulties experienced when completing it using a mobile phone. As future interviews were planned, participants had three opportunities to leave their contact details, which were completed by 999 women.

Descriptive statistics part 1: Demographics.

The majority of women were between 29 and 38 years of age (n=1003, 49.3%),[59] employed (n=1385, 68.1%), born (n=1151, 56.6%) and living in Australia (n=1408, 69.2%), Caucasian (n=1718, 84.4%) home owners (1046, 51.4%) of varying levels of education, with 58% (n=1174) having completed higher education (undergraduate (n=685, 34%) or postgraduate (n=489, 24%) degrees). The sample were mostly married or in a defacto relationship (n=1476, 72.5%).[60]

[59] Between 45-55% of each age group were willing to participate in further research. The majority of women in the pilot study were aged between 25-44 (n=342, 72.6%), see Table A.1. in Appendix A.
[60] The marriage/domestic partnership rate in this sample is reflective of the general population of Australian women. See the Australian Longitudinal Study on Women's Health: 1973-78 Cohort summary 1996-2012 (2014:6).

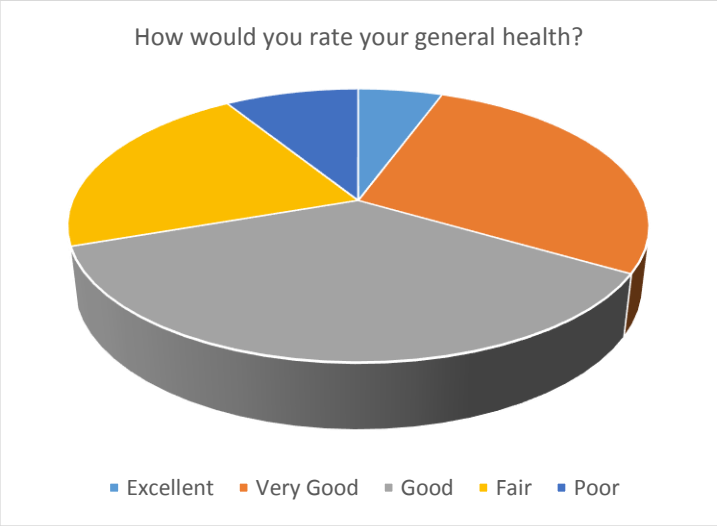
Table 1. Demographic analysis of participants

	Count (%)		Count (%)
Age (years)		**Ethnicity**	
18-28	505 (24.8%)	Caucasian only	1718 (84.4%)
29-38	1003 (49.3%)	Other	282 (13.9%)
39-48	527 (25.9%)	Missing	35 (1.7%)
Employment status		**Housing**	
Student	150 (7.4%)	Living with parents	240 (11.8%)
Employed (full or part time)	1385 (68.1%)	Student dormitory	11 (0.5%)
Unemployed	76 (3.7%)	Renting	705 (34.6%)
Parent	246 (12.1%)	Home owner	1046 (51.4%)
Disabled/sick leave	65 (3.2%)	Other	11 (0.5%)
Maternity leave	29 (1.4%)	Missing	22 (1.1%)
Self-employed	51 (2.5%)		
Study and work	28 (1.4%)		
Other	5 (0.2%)		
Country of birth		**Education level**	
Australia	1151 (56.6%)	Primary school	17 (0.8%)
USA	309 (15.2%)	High school	248 (12.2%)
UK/Ireland	184 (9.0%)	Trade/apprentice	37 (1.8%)
New Zealand	106 (5.2%)	Certificate/diploma	536 (26.3%)
Canada	45 (2.2%)	Undergraduate	685 (34%)
Other Europe/Russia	101 (5.0%)	Postgraduate	489 (24%)
Asia	71 (3.5%)	Missing	22 (1.1%)
Africa	38 (1.9%)		
Other America	27 (1.3%)		
Other Pacific	3 (0.1%)		
Country of residence		**Relationship status**	
Australia	1408 (69.2%)	Married/defacto	1476 (72.5%)
USA	308 (15.1%)	Widowed	6 (0.3%)
UK/Ireland	99 (4.9%)	Divorced/separated	85 (4.2%)
New Zealand	76 (3.7%)	Single	405 (19.8%)
Canada	41 (2.0%)	Long-term/engaged	28 (1.3%)
Other Europe/Russia	57 (2.8%)	Dating	13 (1.0%)
Asia	34 (1.7%)	Missing	22 (0.9%)
Africa	9 (0.4%)		
Other America	2 (0.12%)		
Other Pacific	1 (0.08%)		

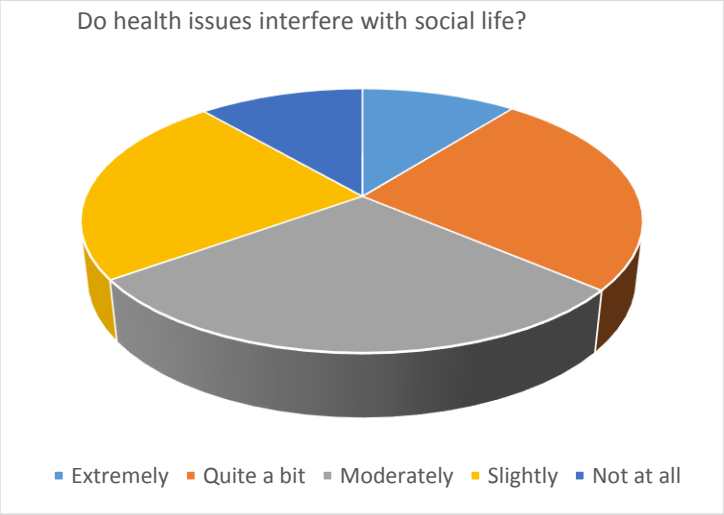
The sample shows the following characteristics regarding general health (Graph 3a), how health issues impacted their social lives (Graph 3b), and severity of feelings of anxiety or depression (Graph 3c):[61]

[61] See Appendix B Table B.1a for specific data on these variables. Graph 3b and 3c relate to experiences of the previous year, and are discussed further in the mental health sections below. Note: throughout, anxiety/depression is measured as self-reflected and self-reported phenomena, *not* a clinical diagnosis (even though this may apply to some within the sample).

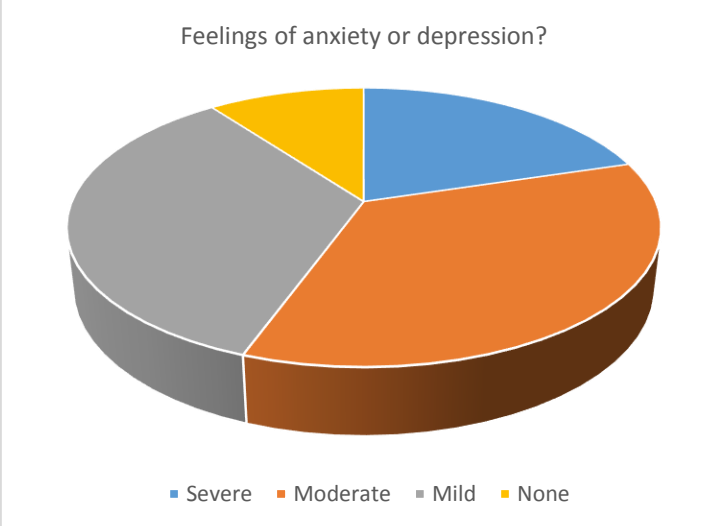
Graph 3a. General health



Graph 3b. Health issues interfering with social life



Graph 3c. Feelings of anxiety or depression



Around a third (36%) of the sample described their general health as being 'good', that health issues 'moderately' impacted their social lives (29%) and that they had experienced 'mild' feelings of anxiety or depression in the previous year (34%). Around 10% of the sample described their general health as being 'poor' and that their social lives were 'severely' impacted by their health, and 20% indicated severe feelings of anxiety or depression in the previous year.

Descriptive statistics part 2: GI variables.

Most participants described themselves as omnivores (n=1672, 88%).[62] Participants were asked about both the severity and frequency for several GI system variables that had occurred in the previous year these included: constipation, diarrhoea, bloating, abdominal pain, IBS, nausea/vomiting, and reflux/heartburn, history of GI medications and surgery.[63] More than three quarters of the sample experienced some level of constipation (n=1530, 77%), and most of those women described it as occurring unpredictably (n=783, 51%). Diarrhoea presented with slightly higher results; 83% experienced some diarrhoea (n=1639) and again, it was mostly unpredictable (n=904, 55%).[64] Bloating and abdominal pain had the highest rates of severe responses, with 630 women experiencing severe bloating (32%) and 700 women experiencing severe abdominal pain (36%). Both of these symptoms presented far more frequently than other GI symptoms, with approximately

[62] Note: this and further percentage references relate to the sample remaining and answering the related question. In this instance, 128 women had dropped out of the survey.
[63] See Appendix B Table B.2 for full descriptive data on these variables.
[64] See Table B.2 in Appendix B. It is interesting to contrast these results with that of Lee, Mayer, Schmulson, Chang and Naliboff (2001), who studied male and female patients with IBS and found that women were more likely to suffer constipation (63% vs 48%); even so, diarrhoea may be more common than constipation among women.

20% reporting daily abdominal pain. IBS, defined as bloating, abdominal pain and varied bowel habits, was reported by 42% of the sample (n=820), nausea/vomiting by 77% (n=1491) and reflux/heartburn by 57% (n=1087).

Descriptive statistics part 3: GI symptoms and the menstrual cycle.

More than half of the cohort (n=1176, 62%) experienced a change of GI symptoms in association with differing phases of their menstrual cycles (total responses n=1907). Diarrhoea was more common (n=645, 34%) than constipation (n=253, 13%) during menses. The most encountered symptom at this time being abdominal pain (n=721 38%),[65] indeed, abdominal pain was also the most frequently encountered symptom at midcycle (n=396, 21%), premenstrually (n=596, 31%) and throughout the whole cycle (n=425, 22%). Reflux/heartburn was the least experienced cyclical digestive symptom, with only 19% reporting cyclical changes (n=371), with it mostly occurring throughout the whole cycle (n=123, 6%). Diarrhoea was most frequently experienced during menses, as described above, constipation was most frequently experienced premenstrually (n=302, 16%), with IBS and nausea/vomiting most frequently experienced during menses (n=313, 16%).[66] Out of the 1807 women who responded to the question on GI medications, 37% (n=672) reported using either prescribed medications or herbal medications, vitamins and supplements. A history of GI surgery was answered by 1795 women, with 21% answering 'yes', indicating surgeries such as removal of gallbladder, appendix, endoscopy or

[65] It is noted here by the investigators, and is evidenced in the biomedical literature listed above, that it is often difficult to distinguish whether abdominal pain comes from a GI or GY origin, with up to 55% of CPP having no known pathological cause (Daniels & Khan, 2010; Daniels et al., 2009).
[66] See tables B.3-6 in Appendix B for full details.

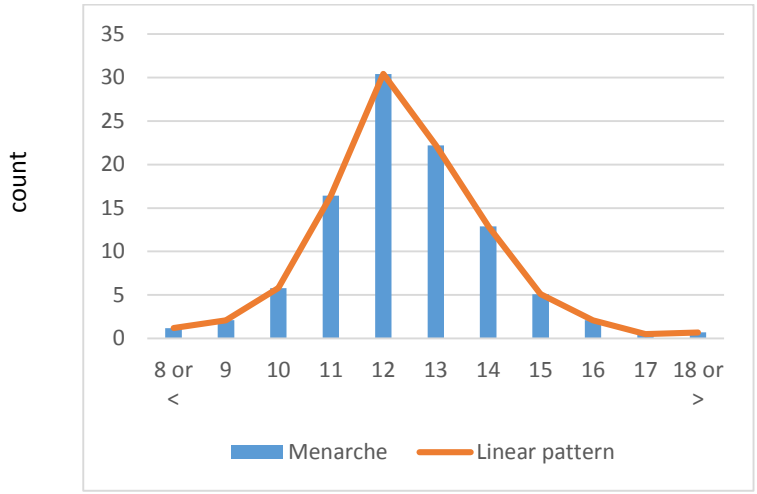
colonoscopy and laparoscopy (primarily for the ablation or excision of endometriosis tissue on the bowel).

Descriptive statistics part 4: GY variables.

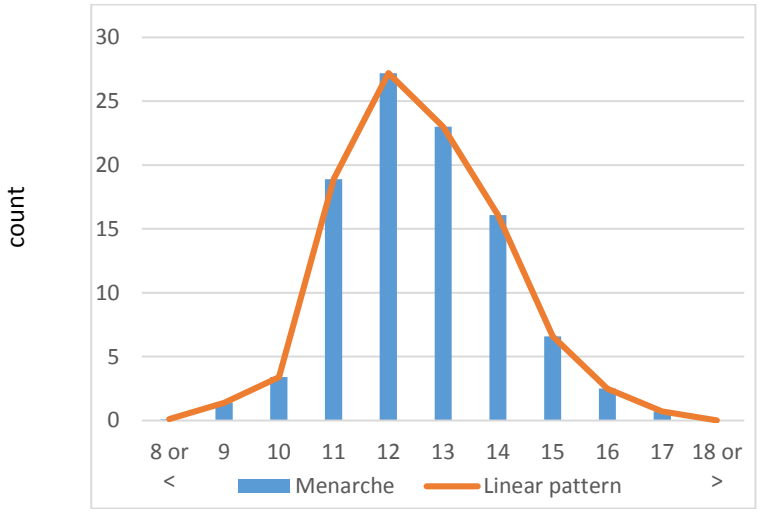
Full GY variables, GY conditions and surgeries are listed in Tables B.7-23 in Appendix B. As can be seen in the graphs 4a-4c below, the age of menarche had migrating rates when viewed over the three age groups in the sample (18-28: n=505, 29-38: n=1003, 39-48: n=527). The average age of menarche in this sample changes from 13 years of age for the more mature group (n=119, 28%) to 12 years of age for the youngest group (n=130, 31%), indicating a steady reduction in the age of menarche over the 10 year age gaps.[67]

[67] In their analysis, Nappi and Berga (2010:304) suggest a median age of menarche of 12.4 years.

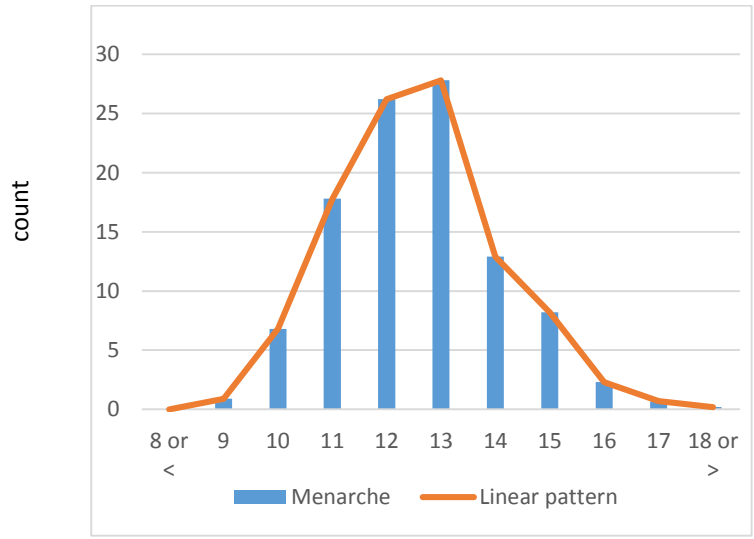
Graph 4a. 18-28 year old group age of menarche



Graph 4b. 29-38 year old group age of menarche



Graph 4c. 39-48 year old group age of menarche



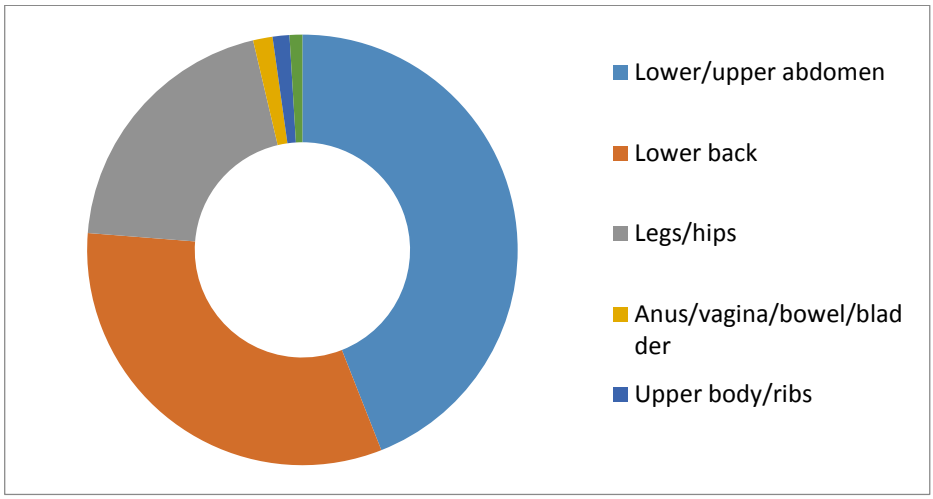
One-way ANOVA showed a statistically significant difference in the three means of age groups and age of menarche: the 18-28 year group mean age of menarche was 12.4 years, for the 29-38 year group the mean was 12.6 years, and for the 39-48 year group it was 12.7 (p=0.03). A Tukey HSD post-hoc test found a significant difference between the younger and older groups (p=0.03).

Of the 1712 women, 84% (n=1436) were still menstruating, and of those not menstruating the reasons cited were mostly due to the oral contraceptive pill (OCP) or other drugs (n=131, 48%) or hysterectomy, hysteroscopy or ablation (n=104, 38%).[68]

Fifty two percent (n=839) of the remaining sample (n=1602) had a history of severe dysmenorrhoea, with 1353 having experienced some level of period pain in the previous year, most of which occurred with each menstrual cycle (n=670).[69] Sites of period pain are indicated in Graph 5, with the majority of women experiencing pain in the lower or upper abdomen (n=1309, 87%)[70] and lower back (n=958, 63.9%). Over two thirds of those who reported some level of dysmenorrhea had taken some form of pain medications for their periods in the past year (n=1117, 71%), with 65% (n=730) having to take medications with each period.

[68] See Appendix B, tables B.8-10 for full data. Drugs listed by participants ceasing their menses were: *The oral contraceptive pill, Minerva, Mirena, Visanne, Aygestin, Femara, Lupron, Decapeptyl, Cerazette, Esmya, Implanon, Zoladex, Depo-Provera, Provera, Nexplanon,* Cyproterone *acetate (CPA), and IUD.*
[69] See Table B.11 in Appendix B for full data.
[70] Some women specified their ovaries, belly button or unilateral pain. See Table B.12 in Appendix B.

Graph 5. Sites of dysmenorrhoea



A history of irregular menses was identified by 808 women (51% of remaining sample), and of those who had irregular menses in the previous year (n=646), most of whom indicated that their menses came unpredictably early or late (n=458, 57%).[71] The average length of menstrual cycles was most commonly reported at being 26-30 days, and the average length of bleeding was reported to be up to three days and up to seven days (see Table 2 and 3).[72]

[71] See Table B.13 in Appendix B. In a similarly powered study (n=2166), Nohara, Momoeda, Kubota and Nakabayashi (2011) found that only 17% of their sample reported irregular menses, perhaps showing a geo-ethnocentric protective feature in the Japanese.

[72] Harlow and Campbell's (2004:7) literature review suggests approximately 8% of women report menses longer than 7-8 days, which is comparable with the current results for 8 days or longer (9.5%).

Table 2: Average length of menstrual cycles	
20 days or shorter	53 (3.4%)
21-15 days	183 (11.7%)
26-30 days	752 (48.2%)
31-35 days	192 (12.3%)
36 days or longer	48 (3.1%)
Varied length	333 (21.3%)
Total	1561 (100%)
Table 3: Length of menstrual bleeding	
1 day	3 (0.2%)
Up to 2 days	22 (1.4%)
Up to 3 days	136 (8.7%)
Up to 4 days	227 (14.5%)
Up to 5 days	357 (22.9%)
Up to 6 days	202 (12.9%)
Up to 7 days	276 (17.7%)
8 days or longer	148 (9.5%)
Varied length	166 (10.6%)
No bleeding	24 (1.5%)
Total	1561 (100%)

Subjective measures described menstrual flow as 'very light', 'light', 'moderate', 'heavy', and 'very heavy'. Those who responded 'heavy' or 'very heavy' were categorised as 'heavy bleeding' (n=647, 42%), which mostly occurred every cycle (n=350, 54%).[73] Menstrual clotting (n=1219, 80%) was also experienced most commonly with each cycle (n=543, 45%).[74] Women who experienced ovulation pain (n=1036, 68%) and menstrual headaches (n=932, 62%) where more likely to experience these each cycle,[75] while menstrual migraines (n=524, 35%) where more likely to occur less frequently such as one to three times out of six cycles.[76]

PMS was experienced by 1397 (93%) out of the 1506 responding women,[77] and PMS was likely to occur with each cycle (n=862, 62%).[78] The specific PMS symptoms reported were headaches, migraines, sore breasts/nipples, mood changes, bloating, bowel changes and acne/breakouts. Mood changes (n=1301, 96%) and bloating (n=1264,

[73] See Table B.14 in Appendix B for full data.
[74] See Table B.15 in Appendix B for full data.
[75] See Tables B.16-17 in Appendix B for full data.
[76] See Table B.18 in Appendix B for full data.
[77] Skip-logic was used in the creation of the online survey, so women who were not currently menstruating would skip past all further menstrual related questions.
[78] See Table B.19 in Appendix B for full data. These results are similar to the findings of Kane et al., (1998), Parker, Sneddon and Arbon (2010) and Dennerstein, Lehert and Heinemann (2012), however, are larger than those found by Ju et al., (2014b) who report a prevalence of 80%. The reporting of severe PMS (37%) was higher in this study than the approximately 20% generally suggested by Ju and colleagues.

93%) being the most frequently reported.[79] Women who reported being diagnosed with a GY condition (n=988, 67%) indicated a diagnosis of endometriosis and/or adenomyosis (n=724, 49%), ovarian cysts (n=525, 35%), abnormal pap smear results (n=278, 19%), PCOS (n=262, 18%),[80] fibroids and/or polyps (n=214, 14%) and amenorrhoea (n=68, 5%).[81] Of those who responded to questions about GY surgeries (n=1477), 60% (n=886) reported one or more interventions, the most common being laparoscopy or laparotomy (n=681, 46%), ablation or excision of endometriosis (n=553, 36%) and dilatation and curettage (n=361, 24%).[82]

Descriptive statistics part 5: Fertility and obstetrics.

Women were then asked about their fertility and pregnancy history. Of the 1581 women responding, 26% (n=479) indicated experiencing infertility (as defined as a history of trying to fall pregnant unsuccessfully for 12 months or more), with most cases categorised as being due to 'female factors' (n=360, 75%),[83] and 15% (n=245) had used some form of assisted reproductive technologies (ART).[84] Over 50% (n=899) reported a history of pregnancy between one and more than five times, with the most common pregnancy

[79] See Table B.20 in Appendix B for full data. Other PMS symptoms described by participants were fatigue, fainting, dizziness, back pain, leg pain, increased appetite and cravings, pelvic and ovarian pain, increased excitement and libido, nausea and vomiting, irregular body temperatures, water retention, awkwardness, insomnia, mouth ulcers, spotting, shortness of breath and palpitations, boils, and suicidal thoughts.
[80] This result falls within the considered average rate of PCOS globally, which is 6-21% (Joham, Teede, Ranasinha, Zoungas & Boyle, 2015), however, the results for endometriosis are far higher in this sample than the average rate of 10% (Mu et al., 2016).
[81] Other diagnoses were interstitial cystitis, adhesions, pelvic floor dysfunction, dysmenorrhoea, thrush, tubal disorders, vaginitis, vaginismus, cancer, endometrial hyperplasia, natural killer cells, pelvic inflammatory disease, congenital adrenal hyperplasia, bladder and uterine prolapse, cervical dysfunction, abnormal uterine shape, dysphoric menstrual disorder and dermoid cysts.
[82] See Table B.22 in Appendix B for full data.
[83] See Table B.23 in Appendix B for full data.
[84] See Table B.24 in Appendix B for full data and specific ART procedures.

outcomes being a live birth (n=1186) and a first term miscarriage (n=638).[85] Of those who had been pregnant, over 50% (n=474) reported birth complications or interventions such as epidural (n=263, 56%), artificial induction (n=220 46%), emergency Caesarean section (C-section) (n=187, 40%), ventouse/forceps (n=146, 31%) and planned C-section (n=113, 24%).[86] Symptoms during gestation were reported with variables of interest being morning sickness (see below), gestational constipation (n=524, 59%),[87] diarrhoea (n=269, 31%), headaches (n=403, 46%), migraines (n=185, 21%) and anxiety or depression (n=190, 22%). Morning sickness was experienced by 693 (79%) of the pregnancy sample (n=883), and nearly all of these experienced it in the first trimester (99%). Seven hundred and twenty-five women responded to our question regarding a diagnosis of PND in the year following birth, with 286 (39%) reporting PND. A history of breastfeeding was also investigated, with 287 women finding it easy (40%), 386 finding it difficult (53%) and 53 women reported not breastfeeding (7%).

[85] These results indicate an average birth rate for the sample of 1.3%. See Tables B.25-26 in Appendix B for full data and specifics regarding the history and amount of pregnancies, outcomes, and birth interventions and complications. Rowlands and Lee (2009) found that mental health and socioeconomic factors influenced the risk of miscarriage among Australian women. Miscarriage rates and associated variables have not been directly assessed in this present study, as it has been shown previously that ascertaining clear variables of association can be difficult (Hure et al., 2012).

[86] Other birth interventions and/or complications described were (most frequent to least): preeclampsia, anaemia/haemorrhage, episiotomy/tearing, preterm labour, breech, nuchal cord, posterior presentation, placenta previa, shoulder dystocia and placental abruption. See Table B.26 in Appendix B.

[87] Several changes during pregnancy are listed as contributing to gestational constipation, including elevated progesterone and oestrogen levels, which act on receptors in colonic tissue, and the enlarged uterus (Lawson, Kern & Everson, 1985; Raigoso et al., 2000; Clark, Slayden, Hettrich & Brenner, 2005; Pickett-Blakely et al., 2010). See Wu (2010:9) for details on reproductive ailments (such as pregnancy-induced constipation) in the CM literature in the Qing dynasty.

Descriptive statistics part 6: Mental health.

Most women described their general health as being 'fair' (22%), 'good' (35%) and 'very good' (27%), and expressed that health issues interfered with their normal social activities 'slightly' (23%), 'moderately' (28%) and 'quite a bit' (25%). While either end of the scales for these questions were comparable, twice as many women had experienced severe feelings of anxiety or depression in the past year (20%) compared to those who had experienced none (10%). Mental health was measured generally, along with specific inquiry regarding PND and specifics about which emotions were most commonly experienced in the previous year.[88]

Women were queried regarding specific emotions. These were measured in frequency, with respondents able to select 'never', 'occasionally', 'often', and 'all the time' for the emotions of: happiness; sadness; depression; grief and/or sorrow; fear, worry and or anxiety; anger, frustration and/or irritability; and excessive thinking and/or churning thoughts.[89] Dichotomised results (infrequent = 'never' and 'occasionally'; frequent = 'often' and 'all the time') are listed in Table 4. Happiness was the highest reported emotion to occur frequently (n=1262, 81%), with grief/sorrow the least frequently experienced emotion (n=272, 17%).

[88] See Graphs 3b and 3c above, Table 4 below, and Tables B.25 and B.39 in Appendix B.
[89] Rumination has been isolated as a key determinant in predicting and maintaining depression (Ellen-ge et al., 2012).

Table 4. Frequencies of specific emotions

Happiness		*Grief/sorrow*	
Infrequent	305 (19.5%)	Infrequent	1295 (82.6%)
Frequent	1262 (80.5%)	Frequent	272 (17.4%)
Total	1567 (100%)	Total	1567 (100%)
Sadness		*Fear/worry/anxiety*	
Infrequent	932 (59.5%)	Infrequent	714 (45.6%)
Frequent	635 (40.5%)	Frequent	853 (54.4%)
Total	1567 (100%)	Total	1567 (100%)
Depression		*Anger/frustration/irritability*	
Infrequent	1156 (73.8%)	Infrequent	816 (52.1%)
Frequent	411 (26.2%)	Frequent	751 (47.9%)
Total	1567 (100%)	Total	1567 (100%)
Rumination, churning thoughts			
Infrequent	604 (38.5%)		
Frequent	963 (61.5%)		
Total	1567 (100%)		

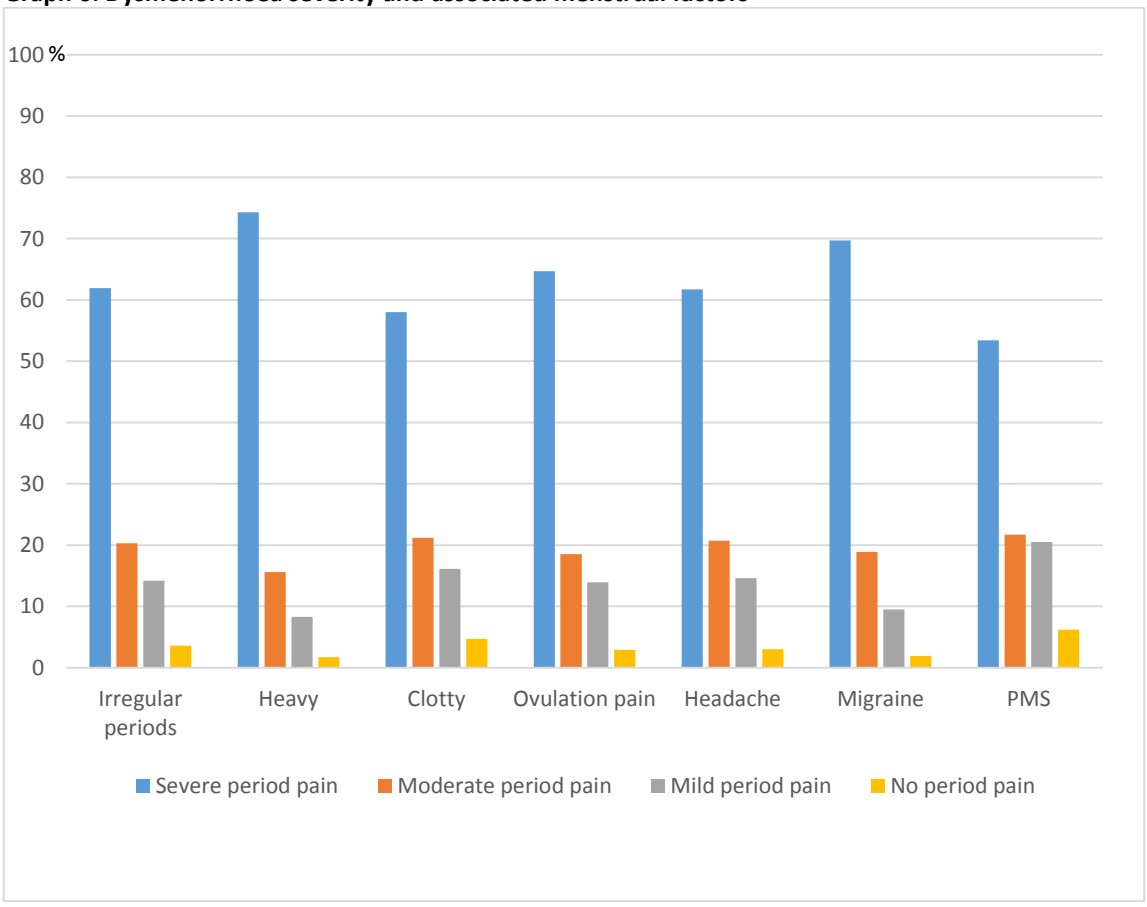
This community-based cohort reveals a variety of GI and GY symptom severities and frequencies, issues with fertility, symptoms of gestation, obstetric interventions or complications, postnatal and mental health issues, allowing for comparisons between adequately powered dichotomised groups. The first hypothesis, that an online survey such as this could recruit an appropriate sample, has been established.

Inferential statistics part 1: GY-GY variable relationships.

1. Gynaecological variables are associated. Dysmenorrhoea is associated with other menstrual phenomena, such as menstrual heaviness and clotting, irregular menses, ovulation pain and premenstrual symptoms.

Is dysmenorrhoea associated with other menstrual factors? If so, is this relationship severity dependent? While dysmenorrhoea is the primary dependant variable of this research thesis, as will be shown, period pain is associated with other menstrual phenomena such as irregular menses, heavy menses, clotty menses, ovulation pain, menstrual headaches and migraines, along with PMS and specific PMS presentations (see Graph 6).[90]

Graph 6: Dysmenorrhoea severity and associated menstrual factors



*all associations significant (p=<0.001).

[90] See Table B.27 in Appendix B for full dysmenorrhoea associations. Also see the pilot study results in Appendix A.

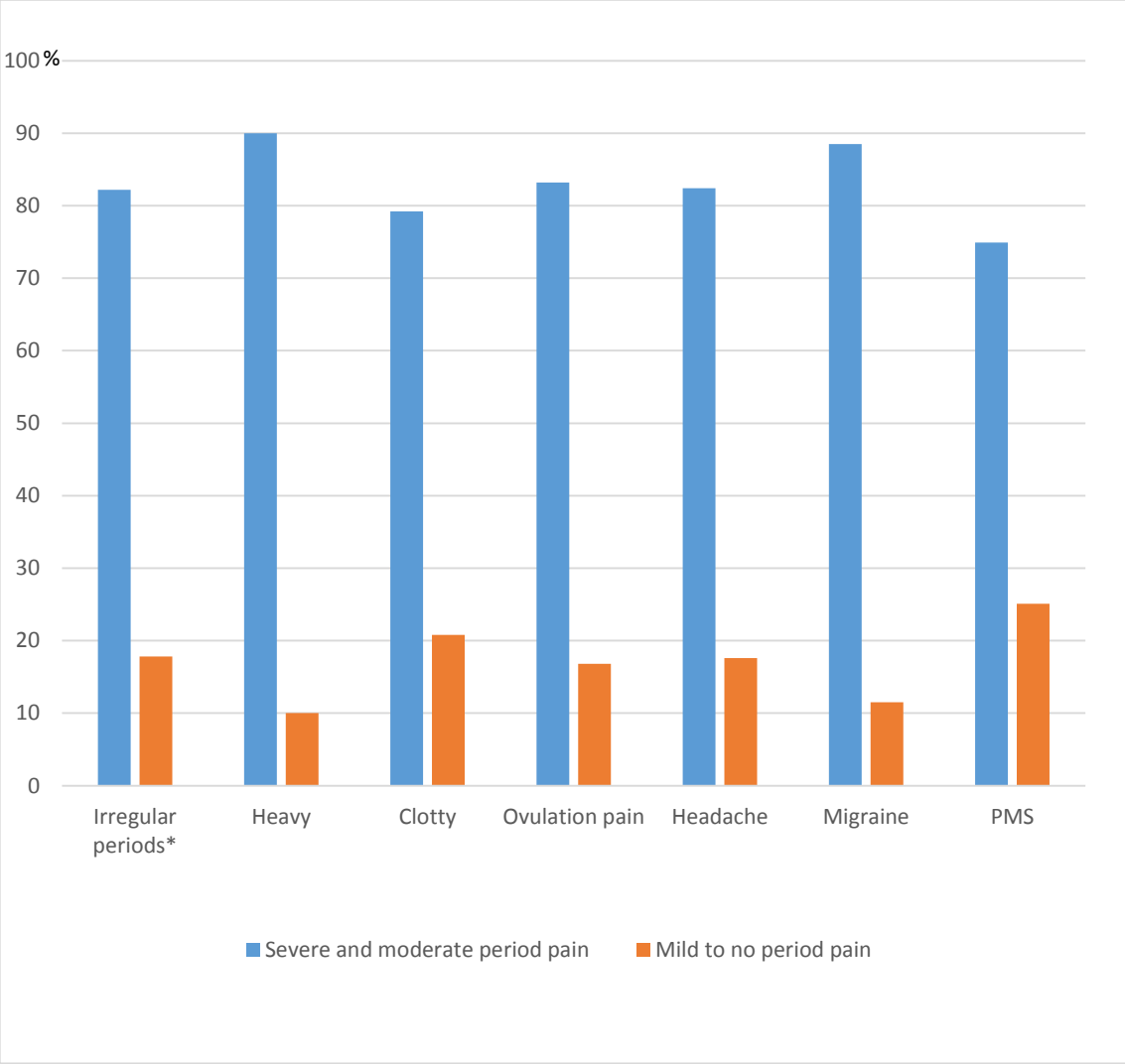
Dysmenorrhoea severity was positively associated with irregular menses (OR 10.2, 95% CI 5.8:18.2, p=<0.001), heavy menses (OR 6.1, 95% CI 3.2:11.5, p=<0.001), ovulation pain (OR 5.1, 95% CI 3.0:3.8, p=<0.001), menstrual headaches (OR 4.1, 95% CI 2.6:6.5, p=<0.001) and migraines (OR 8.2, 95% CI 5.6:12.2, p=<0.001), and PMS (OR 17.1, 95% CI10.7:27.4, p=<0.001).[91] For women who reported dysmenorrhoea over the previous twelve months, the association with irregular menses was staggering, with a possible association being over 10 times higher than for those without dysmenorrhoea (OR 10.2, 95% CI 5.8:18.2, p=<0.001). No women with no period pain experienced very heavy bleeding, and only 2.8% experienced heavy bleeding, while those who experienced severe dysmenorrhoea where the most frequent to encounter severe heaviness (87%). Those who had indicated experiencing dysmenorrhoea in the previous twelve months were twice as likely to experience menstrual heaviness (OR 2.0, 95% CI 1.4:3.0, p=<0.001). Light periods were associated with an increased likelihood of frequent happiness (OR 1.7, 95% CI 1.1:2.7, p=0.02), and were protective of frequent sadness (OR 0.6, 95% CI 0.5:0.9, p=0.005), depression (OR 0.5, 95% CI 0.4:0.9, p=0.002) and grief (OR 0.4, 95% CI 0.2:0.7, p=<0.001).

Of those who experienced severely clotted menses, 99.7% of them also experienced some level of period pain, and 85.6% of those with *severe* dysmenorrhoea experienced *severe* clotting. The presence of ovulation pain was also highly associated with dysmenorrhoea (OR 5.0, 95% CI 3.3:8.0, p=<0.001). Women with dysmenorrhoea were at least four times more likely to experience menstrual related headaches (OR 4.1, 95% CI 2.6:6.5, p=<0.001), and nearly five times more likely to experience menstrual

[91] Similar patterns were seen in the pilot study (see Table A.6. in Appendix A) with the pilot study showing higher odds ratios for ovulation pain (OR 7.6, 95% CI 4.1:14.1, p=<0.001). It is interesting to compare the *combined* (double-barrelled) pilot study measures of heavy/clotty menses (OR 5.7, 95% CI 3.4:9.4, p=<0.001) and headaches/migraines (OR 3.8, 95% CI 2.2:6.6, p=<0.001) and the *separated* measures from this study (see Table A.7. in Appendix A).

migraines (OR 4.8, 95% CI 2.5:9.3, p=<0.001).[92] These results were higher in those women reporting menstrual pain in the previous year, with them nearly six times more likely to suffer migraines (OR 5.6, 95% CI 3.1:10.0, p=<0.001), with this result suggesting that they could even be ten times more at risk. When dichotomising dysmenorrhoea as 'severe' and 'moderate' compared to 'mild' and 'none', we see the following relationships (Graph 7).

Graph 7. The presence and absence of dysmenorrhoea and associated menstrual factors



*all results apart from irregular periods are statistically significant (p=<0.001).

[92] See Table B.27 in Appendix B for full data.

Tables 5 and 6 report on the sample's history of dysmenorrhoea and dysmenorrhoea in the past year, and correlate these with experience of specific PMS symptoms. Dysmenorrhoea was positively associated with premenstrual symptoms whether asked as a general question (*do you have a history of period pain?*) or more specifically (*have you experienced period pain in the past year?*). A *history* of period pain showed a relationship with acne/breakouts (OR 2.6, 95% CI 1.6:4.2, p=<0.001), however period pain in the past year did not.[93] This phenomena was reversed for mood changes, which *was* associated with period pain in the past year (OR 2.5, 95% CI 1.1:5.7, p=0.03).

Table 5: History of dysmenorrhoea and PMS symptom associations

PMS symptom	Odds ratio	95% CI	P-value
Headaches	2.8	1.7:4.6	<0.001
Migraines	4.2	2.1:8.6	<0.001
Breast/nipple sensitivity	1.7	1.02:2.9	0.041
Bloating	3.2	1.7:6	<0.001
Bowel changes	3.9	2.3:6.6	<0.001
Acne/breakouts	2.6	1.6:4.2	<0.001

Table 6: Dysmenorrhoea in the past year and PMS symptom associations

PMS symptom	Odds ratio	95% CI	P-value
Headaches	2.5	1.6:4.1	<0.001
Migraines	3	1.6:5.5	<0.001
Breast/nipple sensitivity	2.1	1.3:3.5	0.004
Bloating	3.8	2.0:7.2	<0.001
Bowel changes	4.3	2.5:7.1	<0.001
Mood changes	2.5	1.1:5.7	0.032

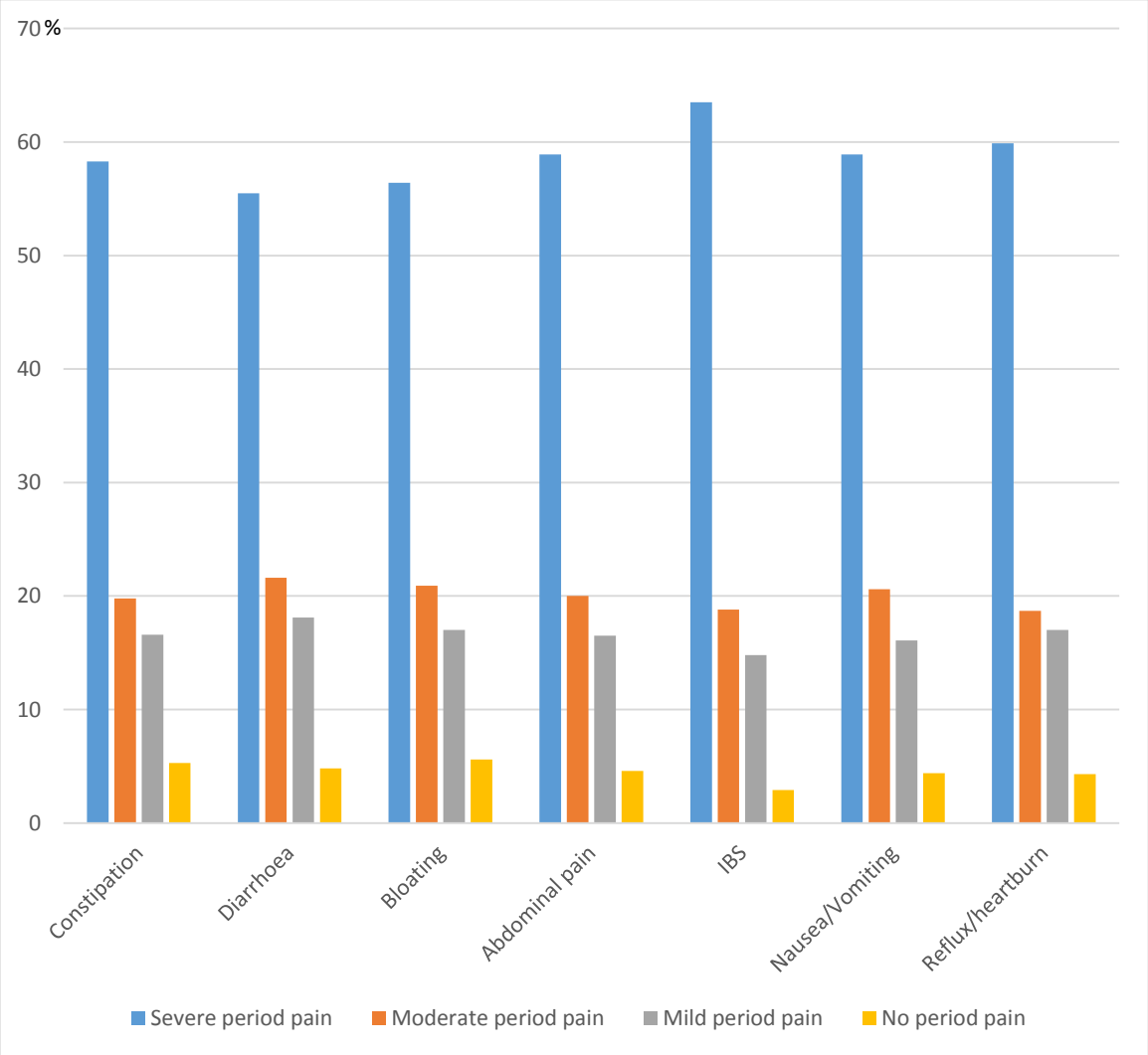
[93] See Table B.27 in Appendix B for full data.

Inferential statistics part 2: GI-GY variable relationships.

2. Dysmenorrhoea severity is positively associated with specific gastrointestinal issues (constipation, diarrhoea, bloating, abdominal pain, irritable bowel syndrome, nausea/vomiting, and reflux/heartburn).

To assess the primary research question of GI and GY comorbidity, dysmenorrhoea severity was used as the dependant variable against GI variables investigated in the study, with the following patterns of comorbidity (Graph 8).

Graph 8: Dysmenorrhoea severity and associated GI symptoms



*all associations were significant at p=<0.001

Dysmenorrhoea severity was positively associated with constipation (OR 3.5, 95% CI 2.7:4.6, p=<0.001),[94] diarrhoea (OR 3.3, 95% CI 2.2:5.1, p=<0.001), bloating (OR 4.9, 95% CI 3.5:6.3, p=<0.001), abdominal pain (OR 4.7, 95% CI 3.5:6.3, p=<0.001), IBS (OR 3.3, 95% CI 2.0:5.5, p=<0.001),[95] nausea/vomiting (OR 3.3, 95% CI 2.6:4.2, p=<0.001) and reflux/heartburn (OR 2.2, 95% CI 1.4:3.3, p=<0.001).[96] Cyclical changes in GI symptoms was also associated with dysmenorrhoea severity; women with a history of moderate to severe period pain being over five and half times more likely to experience GI fluctuations (OR 5.6, 95% CI 3.9:8.0, p=<0.001).[97] GY variables associated with the likelihood of having experienced GI surgery were dysmenorrhoea (OR 3.0, 95% CI 2.3:4.0, p=<0.001), irregular menses (OR 1.5, 95% CI 1.2:1.9, p=0.002) and a diagnosis of a GY condition (OR 3.2, 95% CI 2.3:4.5, p=<0.001). Looking at the cyclical nature of GI symptoms, abdominal pain (31%) and diarrhoea (28%) were the most frequently expressed GI symptoms during menses, abdominal pain (36%) and constipation (17-18%) were most common at midcycle and premenstrually. Severe PMS symptoms reported were migraines (9%), headaches (12%), acne/breakouts (13%), sore breasts/nipples (16%), bowel changes (29%) and bloating (36%).[98] The primary hypothesis of dysmenorrhoea severity being positively associated with GI symptoms has been demonstrated in this sample.

[94] Results adjusted for the use of dysmenorrhoea medications. Pilot study data was not able to be assessed for medication confounding. Women with severe period pain were more likely to experience daily, weekly, and monthly constipation, and less likely to experience unpredictable constipation.
[95] It is highly likely that this is an under-representation of the relationship, as it was found when analysing individual responses for the qualitative interviews in the second part of this research, that women often would respond 'none' to IBS in the GI section of the survey, however, when asked about GI changes related to their menstrual cycle, they would list IBS as one of their cyclical phenomena.
[96] See Table B.27 and cross-tabulation B.1 in Appendix B for full data and specific dichotomisations.
[97] See Table B.27 in Appendix B.
[98] See Table B.2 in Appendix B for full GI symptom fluctuation data.

Inferential statistics part 3: Endometriosis and other GY diagnoses.

The recruited sample exhibits a high proportion of women with endometriosis (n=724, 36% of the total sample) which is well beyond the suggested community average morbidity of 10% (Mu et al., 2016). Analysing the data specifically for those with endometriosis, the level of digestive and mental health comorbidity becomes evident (Table 7).

Table 7: Endometriosis/adenomyosis associations

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (severe vs less)	35.1	22.8:53.8	<0.001
Heavy menses	2.5	1.8:3.3	<0.001
Clotty menses	2.2	1.5:3.2	<0.001
Ovulation pain	5.8	4.2:8.1	<0.001
Menstrual headaches	3	2.2:4.0	<0.001
PMS	2.7	1.5:4.7	<0.001
PMS headaches	2.8	2.0:3.9	<0.001
PMS migraines	2.6	1.9:3.6	<0.001
PMS breast/nipple	2.5	1.7:3.6	<0.001
PMS bloating	5.8	3.0:11	<0.001
PMS bowel changes	5.3	3.2:8.6	<0.001
PMS acne	1.7	1.2:2.3	0.003
Constipation	3.6	2.6:5.0	<0.001
Diarrhoea	1.6	1.1:2.4	0.025
Bloating	7	4.0:12.2	<0.001
Abdominal pain	12.3	7.0:21.5	<0.001
IBS	2	1.5:2.6	<0.001
Nausea/vomit	3	2.1:4.2	<0.001
Reflux/heartburn	1.5	1.2:2.0	0.006
Depressed feeling	2.7	2.0:3.8	<0.001
Gestational headache	1.7	1.2:2.4	0.006
Gestational migraine	2.3	1.4:3.8	<0.001
Anxiety/depression	3.4	2.1:5.7	<0.001
Infertility	1.4	1.0:1.9	0.035
Digestive surgery	2.2	1.5:3.1	<0.001

When comparing those with endometriosis to those with other GY diagnoses, a distinct comorbidity pattern emerges. The key demographic findings from Table 7 for those with endometriosis (in this sample) were that they were less likely to be home owners (OR 0.6, 95% CI 0.5:0.8, p=<0.001), more likely to be in the younger (18-28) age group (OR 2.3, 95% CI 1.6:3.3, p=<0.001,) and less likely to be married or in a domestic partnership (OR 0.6, 95% CI 0.5:0.9, p=0.01). Other non-demographic associations were that endometriosis sufferers were more likely to experience anxiety/depression (OR 3.4, 95% CI 2.1:5.7, p=<0.001), more likely to have their social life impacted by their health (OR 4.5, 95% CI 3.3:6.1, p=<0.001), more likely to have been diagnosed with an ovarian cyst (OR 2.1, 95% CI 1.6:2.8, p=<0.001), and more likely to experience infertility (OR 1.4, 95% CI 1.0:1.9, p=0.04). While they were far more likely to suffer severe dysmenorrhoea in all of the ways measured in this study, this was also true of all other GI and GY variables measured.[99] They were more than twice as likely to take GI medications (OR 2.0, 95% CI 1.5:2.7, p=<0.001) and to have had GI surgery (OR 2.2, 95% CI 1.5:3.1, p=<0.001). These results suggest that those with endometriosis are particularly vulnerable to GI comorbidity, along with other health concerns.

[99] For an analysis of how women diagnosed with endometriosis and/or adenomyosis specifically experience the GI/GY relationship, fertility and gestation, in relation to those with other GY diagnoses and the total sample, see Appendix B, Table B.30. Chart B.30a in Appendix B shows the sample without any GY diagnosis (n=241) and their GI/GY relationship. Whilst still apparent, severe GY morbidity is clearly related to increasing severity of GI symptomatology.

Inferential statistics part 4: Fertility, gestation, obstetric and postnatal relationships.

3. Gastrointestinal and gynaecological symptoms are associated with infertility, risk of miscarriage, symptoms occurring during gestation, obstetrics interventions and complications, along with postnatal depression and difficulty breastfeeding.

Dysmenorrhoea severity was compared with rates of infertility and the use of ART, along with symptoms occurring during gestation. Associations of obstetric complications or interventions are then discussed, followed by possible relationships between dysmenorrhoea and PND and difficulty breastfeeding.

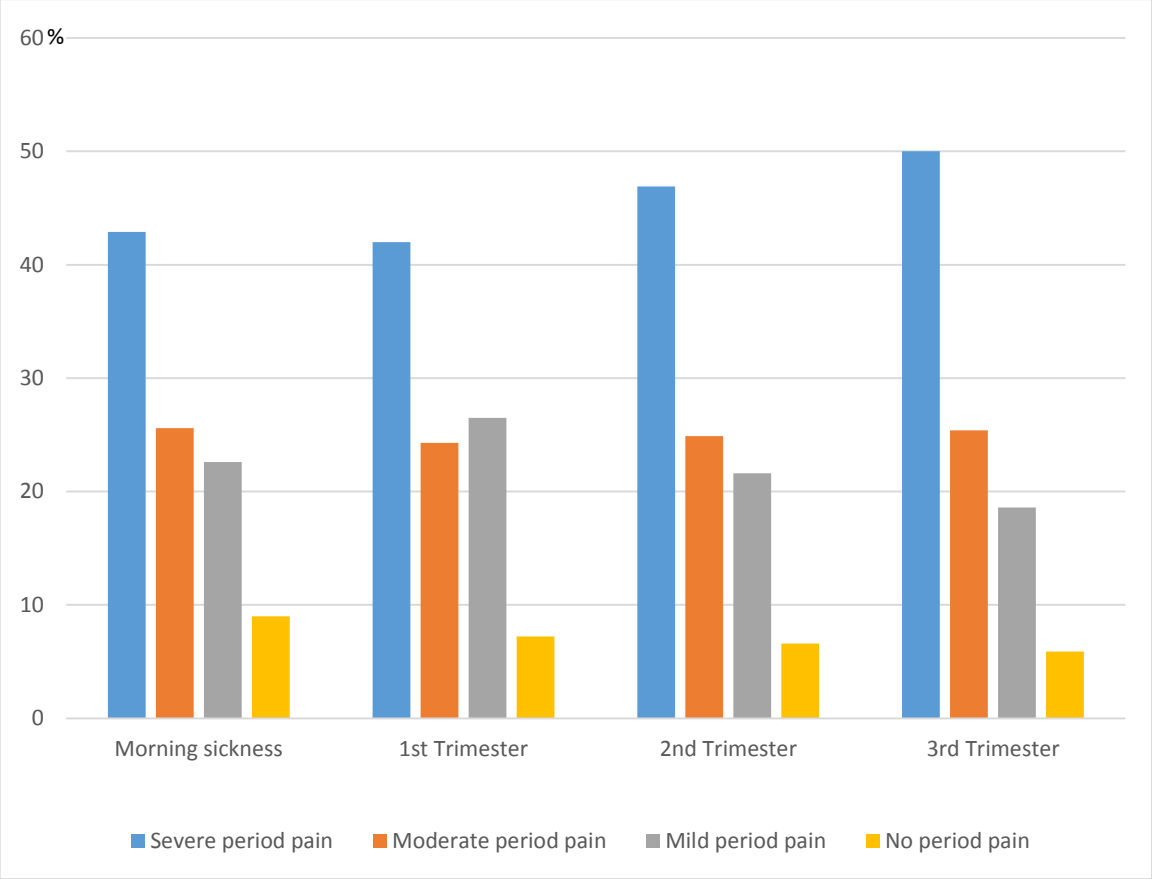
Infertility was positively associated with dysmenorrhoea severity. Women who experienced moderate to severe period pain were 70% more likely to report difficulties conceiving (OR 1.7, 95% CI 1.3:2.2, p=<0.001).[100] Infertility was associated with feelings of depression (OR 1.3, 95% CI 1.0:1.6, p=0.05) and grief (OR 1.8, 95% CI 1.3:2.3, p=<0.001) along with a number of GI variables.[101] The use of ART in this sample was found to be associated mostly with ovulation pain (OR 1.8, 95% CI 1.3:2.6, p=<0.001) and grief (OR 1.5, 95% 1.1:2.1, p=0.02).[102]

Dysmenorrhoea severity was also positively associated with several issues during pregnancy, such as gestational headaches (OR 2.0, 95% CI 1.5:2.7, p=<0.001), migraines (OR 2.8, 95% CI 1.8:4.4, p=<0.001), anxiety/depression (OR 1.7, 95% CI 1.2:2.3, p=0.001) and birth complications (OR 1.5, 95% CI 1.0:1.2, p=0.009).[103] Dysmenorrhoea severity was compared to morning sickness and when it occurred during gestation (Graph 9), other

[100] See Table A.8 in Appendix A. Munsell et al., (2010) found that inflammatory bowel disorders were *not* associated with infertility, and this present study also found no significant associations between women with IBS and infertility. See also Baird, Narendranathan and Sandler (1990) and Hudson et al., (1997).
[101] See Table B.31b in Appendix B for full variables and data.
[102] See Table B.31a in Appendix B for full details.
[103] See Table B.27 in Appendix B.

symptoms of gestation (Graph 10), PND (Graph 11), difficulty breastfeeding (Graph 12), obstetric outcomes (Graph 13) and birth complications or interventions (Graph 14):

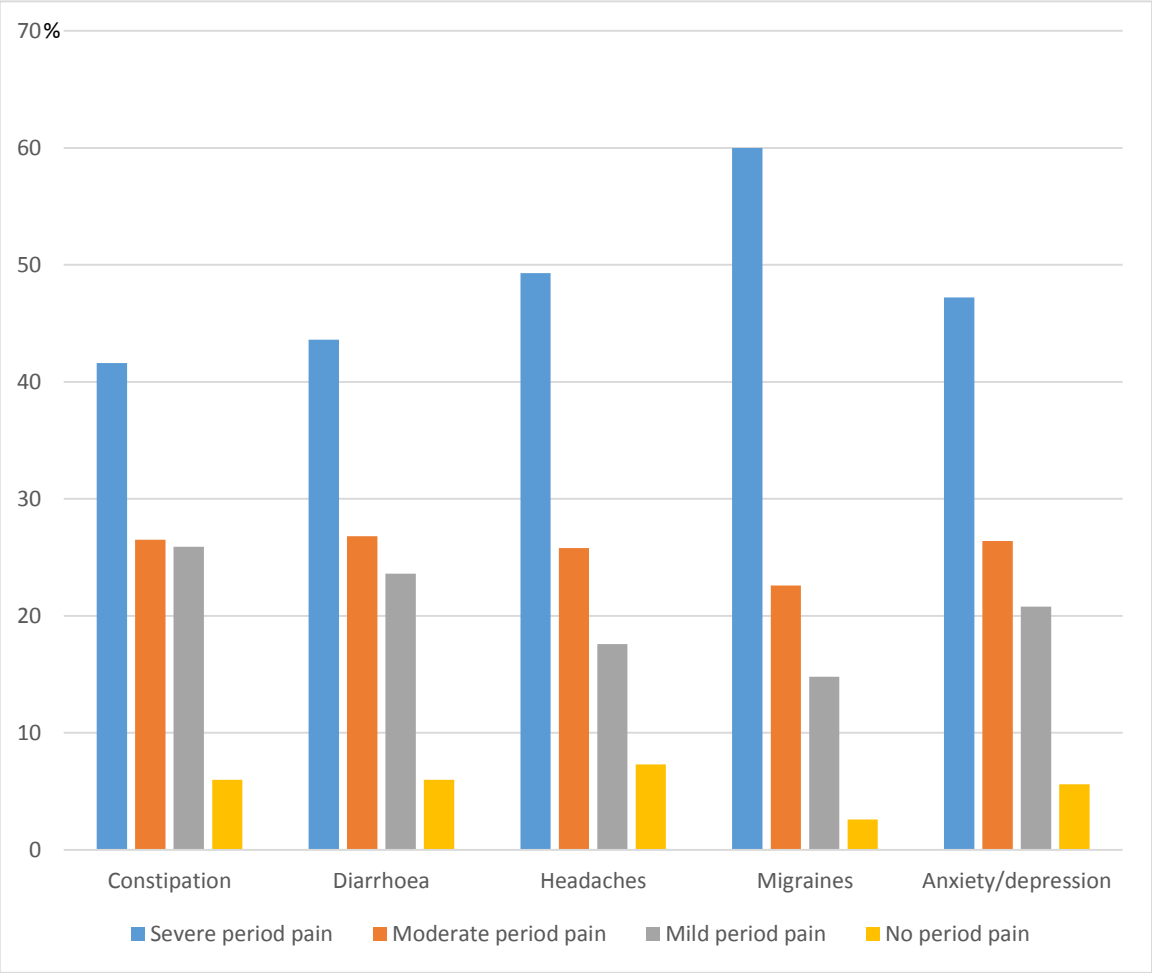
Graph 9. Dysmenorrhoea and morning sickness



Morning sickness was associated with several other variables in this study,[104] such as birth complications/interventions (OR 2.7, 95% CI 1.9:3.9, p=<0.001), general anxiety/depression (OR 2.2, 95% CI 1.4:3.7, p=0.001), gestational anxiety/depression (OR 3.0, 95% CI 1.9:4.6, p=<0.001) and anger (OR 1.5, 95% CI 1.0:2.2, p=0.04). Interestingly, this association with anger was only present when looking at women who experienced it frequently. Anger 'all the time' actually showed protective results against morning sickness in this sample (OR 0.4, 95% CI 0.2:0.8, p=0.009).

[104] See Table B.32 in Appendix B for full details.

Graph 10: Dysmenorrhoea and symptoms of gestation

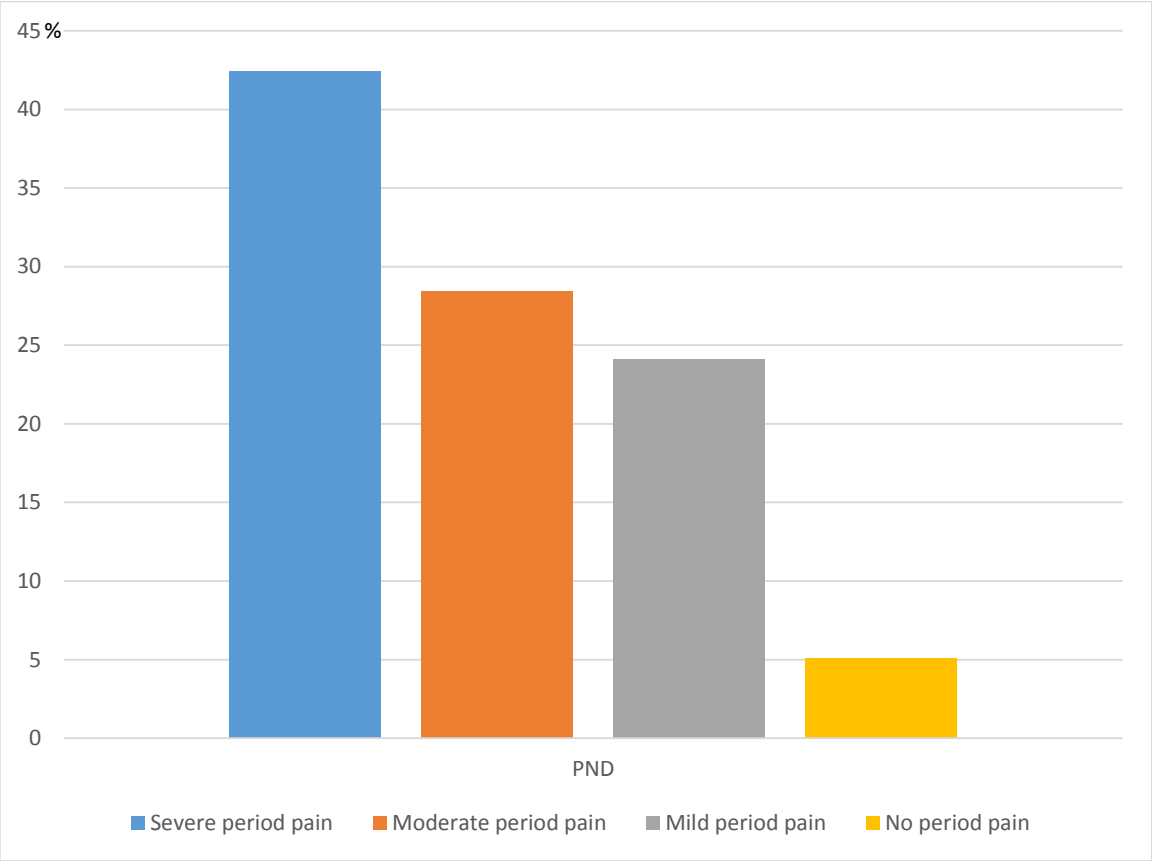


*Headaches and migraines were significant at p=<0.001, and anxiety/depression: p=0.012. These results replicate those of the pilot study (see Graph A.3 in Appendix A).

Gestational constipation, while positively associated with dysmenorrhoea, was negatively associated with clotty menses (OR 0.6, 95% CI 0.4:0.8, p=0.003). General GI variables that were positively associated with gestational constipation were general constipation (OR 2.6, 95% CI 1.9:3.6, p=<0.001), bloating (OR 1.5 95% CI 1.0:2.3, p=0.05), nausea/vomiting (OR 1.4, 95% CI 1.0:1.8, p=0.05), and reflux/heartburn (OR 1.5, 95% CI 1.2:2.2, p=0.002).[105]

[105] See Table B.33 in Appendix B for full details. See Table B.34 for gestational diarrhoea and associated variables, Table B.35 for gestational headaches and associated variables, Table B.36 for gestational migraines and associated variables, and Table B.37 for gestational anxiety/depression and associated variables.

Graph 11: Dysmenorrhoea severity and PND



*significant at p=0.03

PND was associated with a number of variables within this study,[106] as shown in Table 8 below. Both GI and GY variables were shown to be associated with PND, such as IBS (OR 2.0, 95% CI 1.5:2.8, p=<0.001), dysmenorrhoea (OR 1.9, 95% CI 1.4:2.7, p=<0.001) and PMS mood changes (OR 10.1, 95% CI 2.4:42.9, p=0.002). PND was also strongly associated with specific emotions, along with general experiences of anxiety or depression (OR 13.6, 95% CI 6.1:30.1, p=<0.001).[107]

[106] Chojenta et al., (2014) found that the women were more vulnerable during a pregnancy after a previous miscarriage, but that this did not continue in the postpartum.
[107] These results are in line with the work of Reilly et al., (2013), who found that women who were asked about both prior and present mental health issues were 16 times more likely to be referred for further health assessment. For more on perinatal mental health screening, see Austin and Kingston (2016).

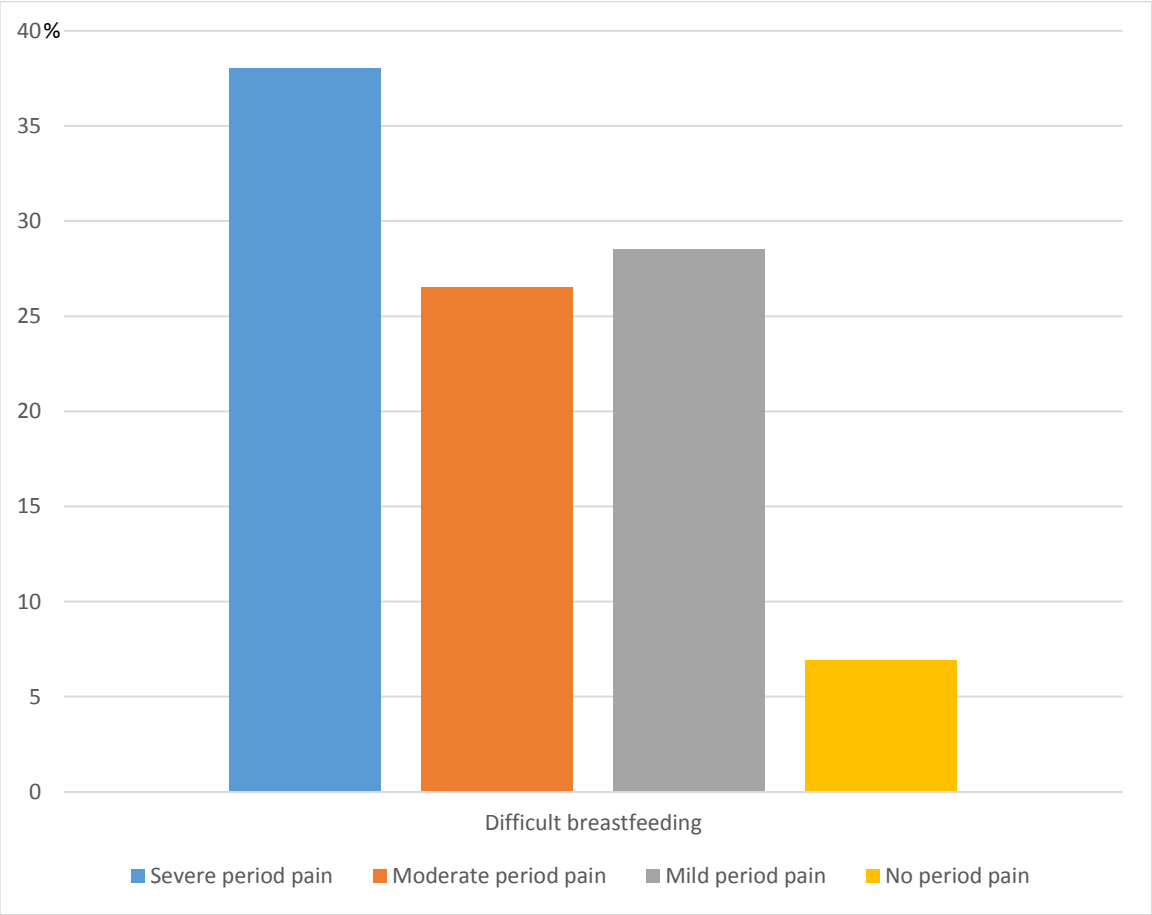
Table 8: PND and associated variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (y/n)	2.2	1.2:4.3	0.01
Dysmenorrhoea*	1.9	1.4:2.7	<0.001
Ovulation pain	1.7	1.2:2.4	0.004
Menstrual migraine	2.0	1.4:2.8	<0.001
PMS breast/nipple sensitivity	1.6	1.1:2.4	0.01
PMS mood changes	10.1	2.4:42.9	0.002
PMS bowel changes	1.6	1.0:2.5	0.05
PMS acne	1.5	1.0:2.2	0.03
Bloating	1.7	1.1:2.7	0.02
Abdominal pain	2.0	1.3:3.0	0.001
IBS	2.0	1.5:2.8	<0.001
Nausea/vomit	1.9	1.4:2.7	<0.001
Reflux/heartburn	1.9	1.4:2.6	<0.001
Anger (always vs less)	3.2	1.5:6.6	0.002
Anger (y/n)	4.0	1.2:14.0	0.03
Sadness	4.5	1.0:20.3	0.05
Depression	4.6	3.2:6.7	<0.001
Sorrow	1.6	1.2:2.2	0.004
Fear	2.4	1.1:5.1	0.03
Rumination	2.3	1.3:4.1	0.004
Morning sickness	2.0	1.2:3.3	0.008
General anxiety/depression (y/n)	13.6	6.1:30.1	<0.001
General anxiety/depression*	5.0	3.6:7.0	<0.001
Happiness*	0.5	0.3:0.7	0.001
Sadness*	2.8	1.9:3.8	<0.001
Depression*	4.7	3.1:7.1	<0.001
Grief*	2.8	1.7:4.6	<0.001
Fear*	3.0	2.2:4.1	<0.001
Anger*	1.9	1.4:2.6	<0.001
Rumination*	2.2	1.6:3.0	<0.001
Gestational constipation	1.6	1.1:2.2	0.008
Gestational diarrhoea	1.7	1.2:2.4	0.001
Gestational headaches	1.6	1.2:2.1	0.004
Gestational migraines	1.8	1.2:2.5	0.002
Breastfeeding (easy/hard)	0.5	0.3:0.6	<0.001
Breastfeeding (hard/easy)	2.2	1.6:3.0	<0.001

*Dichotomised as 'none and mild' compared to 'moderate and severe', or for emotions, 'never and rarely' compared to 'often and always'.

An important aspect of the postnatal period, along with PND, is how successful a mother and child finds breastfeeding. Those who answered that they had a history of breastfeeding and that it was either easy or difficult were analysed regarding any associations with GI, GY and/or mental health variables.

Graph 12: Dysmenorrhoea severity and difficulty breastfeeding

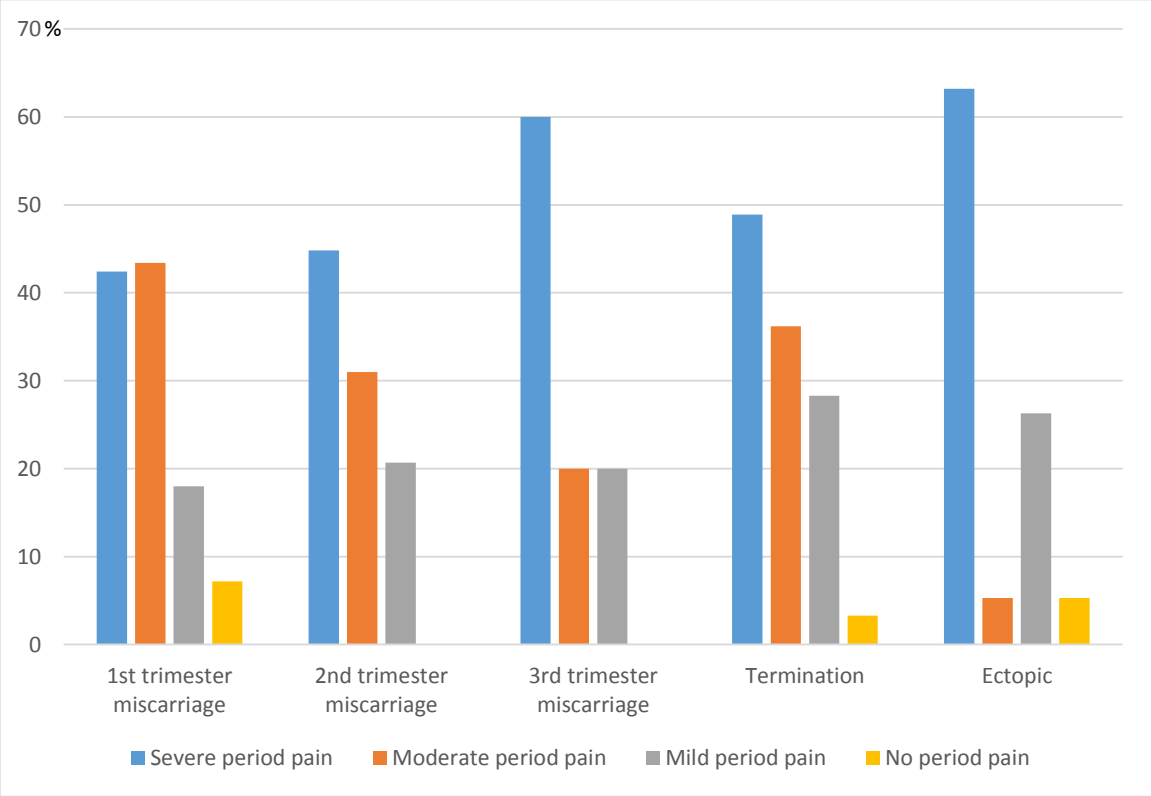


For those who had difficulty, over 60% described having periods coming at irregular times, 66% had moderate to heavy menstrual flow, and 74% experienced some degree of menstrual clotting. Women with IBS were 40% more likely to have difficulty with breastfeeding (OR 1.4, 95% CI 1.1:1.9, p=0.04), nausea/vomiting was also associated (OR 1.7, 95% CI 1.2:2.4, p=0.002), as was reflux/heartburn (OR 1.5, 95% CI 1.1:2.0, p=0.01), moderate to severe bloating (1.5, 95% CI 1.1:2.1, p=0.002) and abdominal pain (OR 1.5, 95% CI 1.1:2.0, p=0.01),[108] birth interventions or complications (OR 1.4, 1.1:1.9, p=0.04), moderate to severe anxiety and/or depression (OR 1.5, 95% CI 1.1:2.0, p=0.01).

[108] As described above, women with CPP have a high incidence of opioid use. Opioids, such as oxycodone, are commonly prescribed postnatally and is detectable in breastmilk within 24 hours, and infants who were exposed to opioids in utero may react differently to postnatal opioid exposure (Darnall, Stacey &

Participants who indicated birth complications or interventions were assessed regarding other commonly experienced variables measured in this study. Along with associations with dysmenorrhoea severity (Graph 11), birth complication or interventions were also associated with difficulty of breastfeeding (OR 1.4, 95% CI 1.0:1.9, p=0.04), and difficulty breastfeeding was associated with PND (OR 2.2, 95% CI 1.6:3.0, p=<0.001).[109] As the pilot study showed a two-fold increase in the risk of miscarriage or termination with moderate to severe dysmenorrhoea (see Table A.8 in Appendix A), this analysis was repeated here:

Graph 13: Dysmenorrhoea severity and obstetric issues



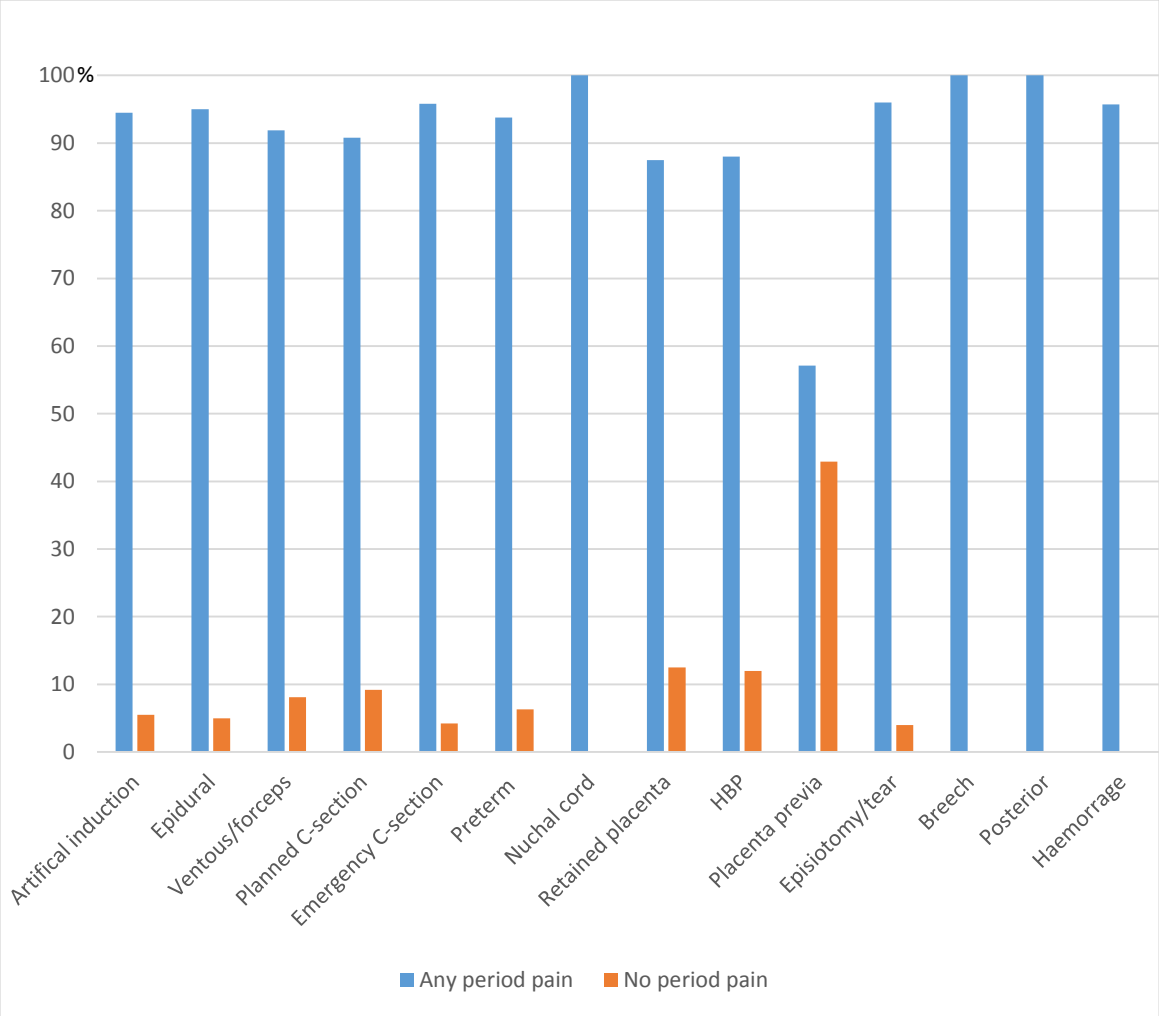
*The sample reported three still births, two from women with severe period pain, and one from a woman with moderate period pain. Of the remaining sample (n=1565), three still births are less than the approximated average rate for developed countries of 5.3 per 1000 births (Stanton, Lawn, Rahman, Wilczynska-Ketende & Hill, 2006; Herbert, Lucke & Dobson, 2009).

Chou, 2012). See also: Ito (2000), Seaton, Reeves and McLean (2007) and Handal, Engeland, Rønning, Skurtveit and Furu (2011).

[109] In their review of the literature over the past 15 years discussing ART outcomes, Helmerhorst & Keirse (2015) state that, apart from the use of ART (and indeed a confounder in studies looking at ART birth outcomes), "…subfertility by itself is a risk factor for several adverse pregnancy outcomes, including pre-eclampsia, antepartum haemorrhage, placenta praevia, preterm birth, low birthweight and childbirth interventions." (p.1). See also DoPierala, Bhatta, Raja and Bhattacharya (2015).

The presence of severe or moderate period pain is positively associated with miscarriage and termination, the presence of dysmenorrhea was associated again with a two-fold increase in miscarriage/termination (OR 2.3, 95% CI 1.3:4.0, p=0.07).[110]

Graph 14: Dysmenorrhoea severity and birth interventions/complications



*other reported complications were pubic dysfunction, overdue, obstructed birth canal, foetal distress, low blood pressure, vomiting and dehydration, postpartum cardiomyopathy, sub-chorionic haematoma, waters broken, foetal maternal transfusion, meconium waters.

Apart from dysmenorrhoea, birth complication and/or interventions were positively associated with several GY, GI, obstetric and mental health factors (See Table 9) measured as either 'yes/no' or 'none/mild and moderate/severe'.

[110] While the probability value here is <0.05, the results from this higher powered study may further the hypothesis of dysmenorrhoea and miscarriage risk.

Table 9: Birth interventions/complications and associated variables.

Symptom	Odds ratio	95% CI	P-value
Married/domestic partnership	1.6	1.0:2.6	0.03
Dysmenorrhoea Dysmenorrhoea (last year)	1.8 1.9	1.01:3.1 1.2:3.1	0.04 0.005
Period pain medications	1.4	1.0:2.0	0.03
Heavy menses	1.4	1.0:2.0	0.04
Clotty menses	1.6	1.1:2.3	0.01
Irregular menses	1.5	1.1:2.1	0.01
Ovulation pain	1.5	1.1:2.1	0.01
GY surgery	1.4	1.0:2.0	0.03
Diarrhoea*	1.4	1.0:1.9	0.05
Abdominal pain*	1.4	1.0:1.9	0.04
Reflux (y/n)	1.4	1.0:1.9	0.03
Anger (y/n)	4.1	1.6:11.0	0.005
Fear	1.4	1.0:1.9	0.05
Rumination	1.4	1.0:1.9	0.04
ART	1.6	1.1:2.5	0.03
Morning sickness	2.7	1.9:3.9	<0.001
Gestational constipation	2.0	1.6:2.7	<0.001
Gestational diarrhoea	1.5	1.1:2.0	0.008
Gestational headaches	1.6	1.2:2.0	0.001
Gestational migraines	1.4	1.0:1.9	0.05
Difficulty breastfeeding	1.4	1.0:1.9	0.04

*As measured 'none and mild' compared to 'moderate and severe'.

Over 90% of birth complications occurred in women with dysmenorrhoea (p=0.006), with each specific complication also more represented in this group. The relative risk of artificial induction was 17 for women with period pain (95% CI 9.7:30.5, p=<0.001), 19 for epidural (95% CI 11.0:33.0, p=<0.001), 11 for ventous or forceps (95% CI 6.4:20.0, p=<0.001), 10 for a planned C-section (95% CI 5.3:18.5, p=<0.001), and 22 for emergency C-section (95% CI 11.0:46.0, p=<0.001). This increased risk remained true when dysmenorrhea was dichotomised as none (none and mild) and yes (moderate and severe), with two times the risk of artificial induction and epidural, 60% more likely to have ventous or forceps and planned C-section, and more than two times as likely to have experience an emergency C-section.

Inferential statistics part 5: Mental health relationships.

4. There is a positive relationship between gastrointestinal and gynaecological symptom severity and mental health, specifically, increased symptoms are related to increased feelings of anxiety or depression, reduced social activities, and increases in the frequency of individually expressed emotions.

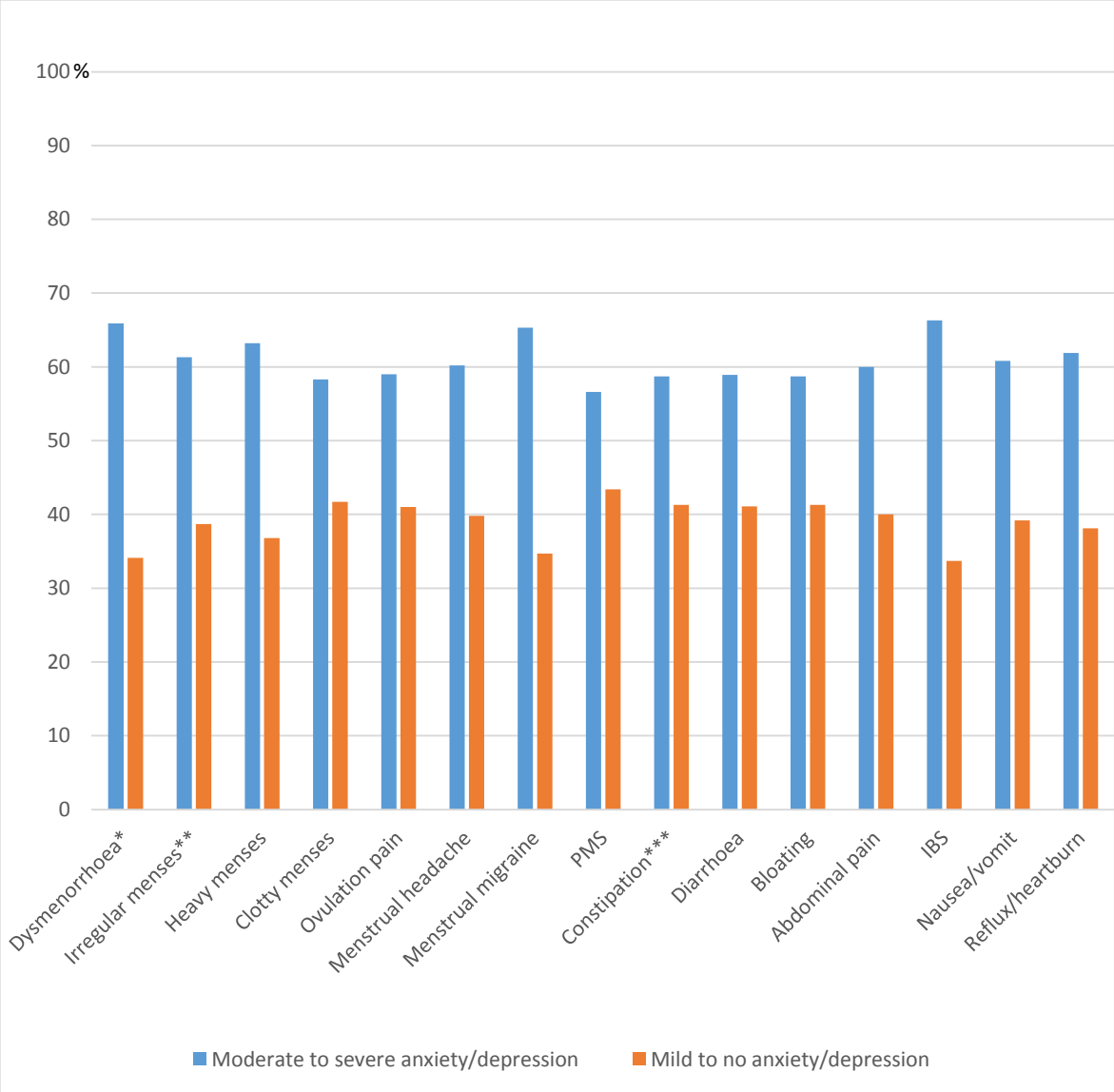
Women's responses to the question 'in the past year, have you felt anxious or depressed?' (yes, severely; yes, moderately; yes, mildly; no) and their responses to GI and GY variables were cross-tabulated (Graph 13). Statistically significant differences were found for those with severe dysmenorrhoea, severe and moderate dysmenorrhoea, any dysmenorrhoea, dysmenorrhoea in the previous year, heavy and clotty menses, ovulation pain, menstrual headaches and migraines, PMS headaches, migraines, mood changes, bloating and acne/breakouts, general constipation, diarrhoea, abdominal pain, IBS, nausea/vomiting, reflux/heartburn, being angry all the time or often, sadness, sorrow, fear, and rumination (all at p=<0.001), along with PMS (p=0.003), PMS breast pain (p=0.006), morning sickness (p=0.01), and gestational migraines (p=0.009).[111]

While seeking those emotions related to specific symptoms of ill health, one emotion stood out as being associated with wellness; happiness was the only emotion shown to be protective of morbidity in this study. It was protective of all GI and GY variables measured.[112] Happiness was protective of overall constipation (OR 0.6, 95% CI 0.4:0.8, p=0.003), as well as moderate to severe constipation (OR 0.6, 95% CI 0.4:0.7, p=<0.001), bloating (OR 0.5, 95% CI 0.3:0.9, p=0.01), abdominal pain (OR 0.4, 95% CI 0.2:0.6, p=<0.001), IBS (OR 0.7, 95% CI 0.5:0.9, p=0.004), nausea/vomiting (OR 0.5, 95% CI

[111] See Table B.38 in Appendix B and compare with the pilot study results listed in Table A.14. in Appendix A, where the highest odds ratio found in relation to anxiety/depression was PMS (OR 5.5, 95% CI 2.9:10.3, p=<0.001).
[112] For other specific emotional relationships, see Table B.39 in Appendix B.

0.3:0.7, p=<0.001), reflux/heartburn (OR 0.6, 95% CI 0.4:0.7, p=<0.001). All other emotions analysed—sadness, depression, grief, fear, anger and rumination—showed increased odds ratios to GI and GY variables (see Table B.39 in Appendix B).

Graph 15: Feelings of anxiety or depression and associated variables.



*Severe dysmenorrhoea compared to less than severe (moderate, mild and none). This relationship showed across dichotomisations of dysmenorrhoea: yes/no (57%), yes/no in the previous year (59%), moderate to severe (62%), moderate to severe in the previous year (64%), and all these results were significant at p=<0.001).

**Irregular menses in the previous year showed a slightly higher result (63.3%) but was less significant (p=0.02).

***This relationship remained significant when measured against 'none and mild' and 'moderate and severe' constipation (p=<0.001).

"Depression is considered to be a result of
multiple complex interactions between environmental and biological factors."[113]

Women who had experienced moderate to severe feelings of anxiety or depression in the previous year were around 70% more likely to have had GY (OR 1.7, 95% CI 1.4:2.1, p=<0.001) and GI surgery (OR 1.7, 95% CI 1.3:2.2, p=<0.001), and twice as likely to have had a GY condition diagnosed (OR 2.0, 95% CI 1.6:2.5, p=<0.001), 50% more likely to be taking medications or supplements for their GI system (OR 1.5, 95% CI 1.3:1.8, p=<0.001), more than twice as likely to be taking medications for their dysmenorrhoea (OR 2.4, 95% CI 1.9:2.9, p=<0.001), and were five times more likely to have experienced PND in the year after giving birth (OR 5.0, 95% CI 3.6:7.0, p=<0.001), along with being more prone to difficulties with breastfeeding (OR 1.5, 95% CI 1.1:2.0, p=0.01).[114]

Women with a history of moderate to severe period pain were *less* likely to experience regular feelings of happiness (OR 0.4, 95% CI 0.3:0.6, p=<0.001), and *more* likely to experience sadness (OR 2.7, 95% CI 2.1:3.5, p=<0.001), depression (OR 4.0, 95% CI 2.8:5.7, p=<0.001), grief or sorrow (OR 2.6, 95% CI 1.8:3.7, p=<0.001), fear, worry or anxiety (OR 2.9, 95% CI 2.3:3.6, p=<0.001), anger, frustration or irritability (OR 2.2, 95% CI 1.8:2.9, p=<0.001), rumination or churning thoughts (OR 2.6, 95% CI 2.0:3.3, p=<0.001) and PND (OR 1.9, 95% CI 1.4:2.7, p=<0.001).[115] One hundred and thirteen women (7% of the 1567 women who answered this question) responded that they felt angry, frustrated

[113] Duke, Sibbritt & Young (2007:27). See also: Harris (2001).
[114] Classical CM sees no distinction between psyche and soma (Rossi & Caretto, 2007; Seidman & Jaensch, 2013), which often puts it at odds with biomedicine. However, as Öberg (2012) shows in relation to the understanding of sexual dysfunction: "Revised definitions of women's sexual dysfunctions have been proposed that do not generally separate organic- from psychogenic-caused dysfunctions…" (p.438). Chojenta, Lucke, Forder and Loxton (2016) show how emotional distress (psyche) during childbirth (soma) and breastfeeding for less than six months (soma) have been shown to be associated with PND (psyche).
[115] It is argued that sadness and low mood are evolutionary responses to adversity, and debates should include the healthy functions and boundaries of sadness and, controversially, suicidality (Hagen, 2011).

or irritated *all the time*. Over 55% of whom had done a diploma, certificate or undergraduate degree, over 65% were married,[116] and over 60% of them rated their health as good to fair, yet 67% felt that their physical or mental health interfered with their lifestyle extremely or quite a bit. Over 90% had felt moderately or severely anxious or depressed over the last year. Over 60% had experienced severe abdominal pain, and 70% experienced severe period pain (65% of whom experienced it with every period). Over 95% of the period pain was felt in the lower abdomen. Irregular periods were experienced by 65% of these women, and over 70% experienced moderately or severely clotty periods, 66% experienced ovulation pain, and over 90% experienced severe to moderate PMS; the most frequently experienced severe PMS symptoms being mood changes (71%), bloating (57%), bowel changes (47%) and sore breasts or nipples (34%). 80% had been diagnosed with a GY condition, and of these, 83% had endometriosis or adenomyosis. Nearly 60% of those who had been pregnant had been diagnosed with PND.[117] Women who experienced bloating had an odds ratio of 2.9 (95% CI 2.0:4.0, p=<0.001) of experiencing frequent rumination, and were less likely to experience happiness (OR 0.52, 95% CI 0.3:0.9, p=<0.001).[118]

Gestational anxiety and/or depression was associated with both 'severe' and 'less than severe' dysmenorrhoea (OR 1.4, 95% CI 1.0:1.8, p=0.03) and 'none' and 'mild' compared to 'moderate' and 'severe' dysmenorrhoea (OR 1.7, 95% CI 1.2:2.3, p=0.001).

[116] Whilst this may suggest a relationship between women's anger and marriage, as shown in Table B.47 in Appendix B, women in a domestic partnership or marriage were between 90%-2000% more likely to experience happiness than those who were single or in other relationship categories!

[117] These results suggest that depression and mental health in general are associated with multiple (apparently disparate) body systems, and while studies on individual diseases (such as stroke—see Jackson and Mishra, 2013) and depression, broader studies may have more impact epidemiologically. From a CM perspective, these results correlate with the emotion of anger being specifically related to disharmony of the Liver (*Jueyin*), which impacts both digestion and menstruation.

[118] Rumination is associated with the Spleen in CM, and 'Spleen deficiency' is a primary cause of bloating.

Other GY variables associated with PND were ovulation pain (OR 1.6, 95% CI 1.2:2.2, p=0.003), PMS breast/nipple soreness (OR 1.4, 95% CI 1.0:2.0, p=0.04) and PMS bowel changes (OR 1.5, 95% CI 1.0:2.3, p=0.05). General GI variables associated with PND were constipation—yes or no—(OR 1.5, 95% CI 1.0:2.1, p=0.02) and constipation—'none' and 'mild' compared to 'moderate' and 'severe'—(OR 1.3, 95% CI 1.0:1.8, p=0.02), diarrhoea (OR 2.1, 95% CI 1.4:3.1, p=<0.001), bloating (OR 1.6, 95% CI 1.0:2.5, p=0.05), abdominal pain (OR 2.1, 95% CI 1.4:3.1, p=<0.001), IBS (OR 1.4, 95% CI 1.1:1.8, p=0.02), nausea/vomiting (OR 2.2, 95% CI 1.5:3.0, p=<0.001) and reflux/heartburn (OR 1.6, 95% CI 1.2:2.2, p=<0.001).[119]

Inferential statistics part 6: Demographics characteristics and key variables.

Demographic data collected was used to ascertain whether ethnicity, socioeconomic and/or relationship (broadly described as socio-economic status—SES) factors were involved in skewing the results. For example, some discourse describes race, gender and age being factors influencing the experience of pain (Torres et al., 2013). The cohort obtained was mostly Caucasian Australian, and a larger international and more diverse group could have allowed for further, more refined cross-national-cultural analysis.

In this sample of women, those who identified themselves as being Caucasian had a higher incidence of diarrhoea (OR 1.7, 95% CI 1.2:2.3, p=0.001), abdominal pain (OR 1.4, 95% CI 1.0:2.0, p=0.04), IBS (OR 1.5, 95% CI 1.2:2.0, p=0.002), and the consumption of GI medications (OR 1.4, 95% CI 1.0:1.8, p=0.04). Those who identified themselves as non-

[119] See Table B.37 in Appendix B for full data and variables.

Caucasian had a higher risk of GY surgery (OR 1.5, 95% CI 1.1:2.1, p=0.007).[120] It has been suggested that Caucasians experience more menstrual pain than certain other ethnicities (van den Akker, Eves, Service & Lennon, 1995; Edwards et al., 1999; Sheffield, Biles, Orom, Maixner & Sheps, 2000; Zhu et al., 2009), however this present study was not able to replicate these findings.

Women living in Australia showed markedly less severe symptomatology when compared to overseas respondents, which is likely due to survey distribution methods; it is highly likely that the general Australian female population were more likely to be exposed to the survey, while overseas women were more likely to be exposed to the survey if they were a part of a group or organisation related to GI or GY morbidity.[121] Women living in Australia had a higher incidence of anxiety/depression (OR 1.5, 95% CI 1.3:1.9, p=<0.001) and PND (OR 1.4, 95% CI 1.1:1.9, p=0.02), and those who had a GY diagnosis had a higher incidence of PCOS (OR 2.3, 95% CI 1.7:3.2, p=<0.001), while women living outside of Australia had a higher incidence of GI morbidity, GI medications and surgery, along with GY symptoms and surgery.[122]

Home ownership and education level were used as measures suggesting socioeconomic level amongst the sample. Participants were categorised as either 'home owners' or 'non-home owners', and compared to survey variables.[123] Home owners were less likely to experience the majority of variables, apart from being more likely to experience birth interventions or complications (OR 1.6, 95% CI 1.2:2.1, p=<0.001), infertility (OR 2.2, 95% CI 1.8:2.8, p=<0.001), the use of ART (OR 3.7, 95% CI 2.7:2.1,

[120] See Table B.40 in Appendix B for full comparison data. It is noted that this sample is heavily biased towards Caucasian respondents.
[121] For example, our survey link was (kindly) distributed by the Endometriosis Research Center in the USA.
[122] See Table B.41 in Appendix B for full comparison data.
[123] See Table B.42 in Appendix B for full comparison data.

p=<0.001) and gestational constipation (OR 1.5, 95% CI 1.0:1.2, p=0.005). While this may indicate an SES relationship, home ownership was logically associated with age; women in the 39-48 year age group were over three times more likely to be home owners (OR 3.2, 95% CI 2.6:3.9, p=<0.001). With increased age comes more time to experience infertility (and thus ART) and birth issues. This was also true for relationship status, with a similar pattern seen in women who were married or in a domestic partnership indicating a lower level of morbidity compared to other women; however, they were also more likely to be in the older age groups.[124]

Education level seemed similarly confounded by age. Undergraduate and post graduate participants were compared to those with lower levels of education, and again, those with higher levels of education were less likely to experience GI, GY and mental health problems, which supports previous research suggesting lower SES is related to higher rates of disease (Dahl, Elstad, Hofoss & Martin-Mollard, 2006). However, higher education level was also associated with increased age. Women who were in the 18-28 year age group were 40% less likely to have completed undergraduate or post graduate education (OR 0.6, 95% CI 0.5:0.7, p=0.001) while those in the 39-48 year age group were 60% more likely than other respondents to have reached these higher levels of education (OR 1.6, 95% CI 1.4:2.0, p=<0.001).[125] The question then became, are these GI and GY variable associations prevalent in this study confounded by age? Younger women in this sample were far more likely to express morbidity.[126] Each of the three age groups (18-28

[124] See Table B.47 in Appendix B for full comparison data.
[125] See Table B.46 in Appendix B for full details.
[126] See Tables B.43-45 in Appendix B for full comparison data. See also: Latthe et al., (2006).

n=505, 29-38 n=1003, 39-48 n=527) were then isolated and investigated individually for GI and GY associations.[127]

In the 18-28 year age group, 80% (n=404) had a history of dysmenorrhoea and 70% (n=353) reported it as being moderate to severe, results slightly higher than the study by Rodrigues et al., (2011) which found a prevalence of 63% in women aged 26 or less.[128] Age was also a key factor in constipation rates (see Tables 47-49 in Appendix B). In the 39-48 year age group, 33% experienced moderate to severe constipation in the previous year, which is 8% higher than the rates found by Koloski et al., (2013) who studied women aged 70-75. Combining their study results on an older demographic with ours, we can see a descending rate of constipation with age:

18-28 = 44%, 29-38 = 41%, 38-49 = 33%, 70-75 = 25%

Other differences noted between age groups were that the younger group were more likely to experience irregular periods than the older group (OR 1.7, 95% CI 1.3:2.3, p=<0.001), and were over eight times more likely to be currently undergoing ART (OR 8.9, 95% CI 2.0:28.7, p=0.004), and were more likely to experience fear, worry or anxiety (OR 7.2, 95% CI 3.1:16.8, p=<0.001) and excessive thinking/churning thoughts 'all of the time' (OR 5.1, 95% CI 2.5:1.4, p=<0.001).[129]

[127] See Tables B.48-50 in Appendix B for full comparison data.
[128] The same study by Rodrigues and colleagues found that 43% of their sample (n=274) felt limited by anxiety and/or depression. The current results for the younger age group (n=505) show that while 71% (n=359) reported feelings of anxiety and/or depression, 34% (n=162) experienced it moderately to severely.
[129] For full details on age related differences see the inferential demographic discussion below and Tables 52-54 and graphs B.1-3 in Appendix B.

Overall, our SES analysis shows that women who are married, older, and have a higher level of education in our sample reported morbidity to a lesser degree than other respondents, which supports earlier findings (Cochrane, 2015). Something to be explored further in later research should be the relationship between the age of menarche and GI/GY comorbidity and severity. As was shown earlier in graphs 4a-c, the younger age group had a statistically and clinically early onset of menarche, and also a higher rate of GI and GY comorbidity odds ratios.[130]

[130] It is interesting to note that it has been shown that IBS has its highest prevalence between the ages of 30-60 (Greenspan et al., 2007; Kilpatrick & Tillisch, 2012), whereas this present study shows a higher morbidity in those younger than 30. Andres and Friedman (1999), along with Munsell et al., (2010) state that IBD predominantly affects women during their *peak reproductive years*, showing clear symptomatic relationships with the menstrual cycle (Parlak et al., 2003; Lee et al., 2007).

Discussion:

"the grotesque body—
open to the world in all its orifices,
unbounded, abusive, devouring…
ever unfinished, ever creating,
ever exceeding its limits in copulation,
pregnancy, childbirth, dying, eating, drinking, and defecating."

Stephen Greenblatt[131]

Result summation:

The aim of this research project was to ascertain the epidemiological implications of the GI and GY comorbidity so often observed in the clinical setting of women's healthcare. While this relationship has been previously discussed, it was uncertain if the relationship was severity-related and if *specific* GI and GY symptoms have unique interactions. Four overarching hypotheses assessing GY-GY and GI-GY relationships along with GI/GY associations to fertility, pregnancy, birth, postnatal and mental health issues, defined the creation and implementation of this study, which successfully utilised an online epidemiological survey of self-selecting participants recruited via social media and convenience snow-ball sampling. An adequately powered[132] sample of reproductive aged women was obtained well within the allocated timeframe, who exhibited a diverse range of healthy to morbid states, and whose data was analysed successfully to reject the null hypotheses of each of the research hypothesis listed:

[131] Greenblatt (1990:64), as quoted in Block (2010, p. xx-xxi).
[132] This study design and sample has 80% power at 5% significance level to detect a difference in correlation between GI and GI symptoms across selected variables of rho=0.5 to rho=0.62. This was calculated using G*Power.

1. Gynaecological variables are associated. Dysmenorrhoea is associated with other menstrual phenomena, such as menstrual heaviness and clotting, irregular menses, ovulation pain and premenstrual symptoms.

From the results of this study the main dependent variable of dysmenorrhoea appears to be intimately associated with other menstrual factors. These associations indicate that, from both a clinician's and a researcher's perspective, it becomes difficult to separate them into isolated variables. This study, along with the pilot study, has shown that dysmenorrhoea severity (in the samples investigated) increased the odds of experiencing all other menstrual phenomena measured with a strong clinical and statistical significance (p=<0.001). Dysmenorrhoea severity was associated with irregular menses (OR 10.2, 95% CI 5.8:18.2, p=<0.001), heavy menses (OR 6.1, 95% CI 3.2:11.5, p=<0.001), clotty menses (OR 3.9, 95% CI 3.0:15.1, p=<0.001), ovulation pain (OR 4.4, 95% CI 3.5:5.7, p=<0.001), menstrual related headaches (OR 4.1, 95% CI 2.6:6.5, <0.001) and migraines (OR 8.2, 95% CI 5.6:12.2, p=<0.001), and PMS (OR 2.7, 95% CI 1.8:4.1, p=<0.001). These results support and extend those of earlier works showing similar associations, such as heavy menstrual loss (OR 4.7), PMS (OR 2.4) and irregular menses (OR 2.0) each being predictors of dysmenorrhoea (Latthe et al., 2006; Osayande & Mehulic, 2014).

2. There are relationships between gastrointestinal and gynaecological symptoms. Dysmenorrhoea severity is positively associated with specific gastrointestinal issues.

The clinical hypothesis that GI and GY variables are closely associated—based on innumerable case examples seen by the primary investigator over the last fifteen years, in biomedical and CM literature, the pilot study and now this current epidemiological study—seems conclusive. The reliability of the results discussed in this study is reinforced

through the replication and extension of the pilot study data. Together, these results have shown that dysmenorrhoea severity is positively associated with all other GI symptoms measured, with GI symptoms revealing a cyclical pattern, furthering the early work of Rees and Rhodes (1976), and more contemporary studies by Kane et al., (1998), Houghton et al., (2002), Lim et al., (2013) and Bernstein et al., (2014). Similarly to Bernstein and colleagues, this present study found that both diarrhoea and abdominal pain were the most commonly described GI symptoms associated with menses. Furthering their work, we found constipation the most frequently experienced GI symptom premenstrually.

Summarising the GI/GY comorbidity as seen in this study, dysmenorrhoea severity was associated with all GI symptoms measured, with odds ratios of 2 or more, and strong statistical significance: constipation (OR 3.5, 95% CI 2.7:4.6, p=<0.001), diarrhoea (OR 2.7, 95% CI 2:3.5, p=<0.001), bloating (OR 4.9, 95% CI 3.5:6.8, p=<0.001), abdominal pain (OR 4.7, 95% CI 3.5:6.3, p=<0.001), IBS (OR 3.3, 95% CI 2.0:5.5, p=<0.001), nausea/vomiting (OR 3.3, 95% CI 2.6:4.2, p=<0.001) and reflux/heartburn (OR 2.2, 95% CI 1.4:3.3, p=<0.001). Similar patterns were seen when analysing other GY symptoms against these GI variables.

3. Gastrointestinal and gynaecological symptoms are associated with infertility, risk of miscarriage, symptoms occurring during gestation, obstetrics interventions and complications, along with postnatal depression and difficulty breastfeeding.

An association between dysmenorrhoea and infertility, miscarriage, along with symptoms of gestation was also found, specifically morning sickness, with clear relationships between dysmenorrhoea severity and morning sickness in each of the three trimesters. Beyond dysmenorrhoea as a sole influence on infertility, the comorbidity of GI and GY phenomena was found to be an important factor, with constipation, bloating, reflux and

GI surgery all being positively correlated with difficulty conceiving. PND was also associated with several menstrual and GI factors, symptoms of gestation and specific emotions. Dysmenorrhoea severity was also associated with difficult breastfeeding, miscarriage in any trimester, ectopic pregnancy and the likelihood for birth complications or interventions.

Infertility was found to be associated with dysmenorrhoea (OR 1.7, 95% CI 1.3:2.2, p=<0.001), irregular periods (OR 1.9, 95% CI 1.3:2.9:, p=0.003), heavy menses (OR 1.4, 95% CI 1.1:1.7:, p=0.006), ovulation pain (OR 2.2, 95% CI 1.7:2.9, p=<0.001), menstrual headaches (OR 1.4, 95% CI 1.1:1.8, p=0.003) and migraines (OR 1.3, 95% CI 1.0:1.6, p=0.02), constipation (OR 1.4, 95% CI 1.1:1.9, p=0.008), bloating (OR 1.5, 95% CI 1.2:1.9, p=<0.001), abdominal pain (OR 1.6, 95% CI 1.3:2.0, p=<0.001), reflux/heartburn (OR 1.3, 95% CI 1.0:1.6, p=0.02), and the feelings of depression (OR 1.3, 95% CI 1.0:1.6, p=0.05) and grief (OR 1.8, 95% CI 1.3:2.3, p=<0.001). All symptoms of gestation showed relationships with several GI and GY symptoms, as did PND and difficulty breastfeeding. Obstetric complications or interventions were positively associated with several factors, such as dysmenorrhoea (OR 1.9, 95% CI 1.2:3.1, p=0.005), diarrhoea (OR 1.4, 95% CI 1.0:1.9, p=0.05), the use of ART (OR 1.6, 95% CI 1.1:2.5, p=0.03), morning sickness (OR 2.7, 95% CI 1.9:3.9, p=<0.001) and difficulty breastfeeding (OR 1.4, 95% CI 1.0:1.9, p=0.04).

4. There is a relationship between gastrointestinal and gynaecological symptoms and mental health, specifically, feelings of anxiety or depression, reduced social activities, and the frequency of individually expressed emotions.

Beyond the specific GI and GY symptom associations, these systems are also clearly related to this sample's experience of mental health, both having a significant impact on women's wellbeing. Looking at dysmenorrhoea and constipation, both symptoms are related to how a woman's health impacts her social life, increasing her risk of compromised life activities by over six and two and half times respectively. Symptoms of anxiety and/or depression were associated with all GI and GY variables measured, either in general or specifically related to emotions during gestation. The experience of moderate to severe anxiety and/or depression in the previous year was positively associated with many of the variables in the study, such as dysmenorrhoea (OR 2.3, 95% CI 1.5:3.5, p=<0.001), clotty menses (OR 1.9, 95% CI 1.5:2.5, p=<0.001), ovulation pain (OR 1.6, 95% CI 1.3:2.0, p=<0.001), constipation (OR 2.0, 95% CI 1.7:2.4, p=<0.001), diarrhoea (OR 2.2, 95% CI 1.7:2.8, p=<0.001), bloating (OR 2.9, 95% CI 2.0:2.4, p=<0.001), IBS (OR 2.1, 95% CI 1.8:2.4, p=<0.001), the use of GI medications/supplements (OR 1.5, 95% CI 1.3:1.8, p=<0.001), and surgery of both the GI (OR 1.7, 95% CI 1.3:2.2, p=<0.001) and GY systems (OR 1.7, 95% CI 1.4:2.1, p=<0.001). The frequency of experiencing individual emotions also showed relationships to physical symptoms, along with mental health issues in general, during pregnancy and PND.

General discussion and implications:

> "A PhD student recently described working on her thesis like wading through a pool; a few balls are floating on the surface, easy to see, yet when she (either through slipping or on purpose) submerged herself, a whole world of variables, previously hidden, were revealed. Isolated variables are terribly difficult to pin down, as everything exists in relation to something (or rather, many things) else." [133]

Taking a step back from analysing symptoms, the demographic data provided some means of assessing for possible confounders. The most interesting findings could all be related to age. One of which being the age of menarche, which occurred earlier in the younger age group, with a statistically significant difference of three months between the youngest and oldest groups. Five years ago Barnhart (2011) stated that puberty was occurring several years earlier than in previous generations. The classical Chinese method of accruing age describes conception as the starting point, thus we are already nearly a year old by the time we are born. Considering the age of menarche was typical described as being 14 in the Han dynasty (therefore 13 by today's standard), the average age of this sample in 2015 being 12.6 suggests a mere four-month difference over the last 2000 years.

Age was also found to be a measure modifier rather than a confounder, with increasing age leading to a reduction in reported physiological and psychological symptomatology overall. Each age group showed both statistically and clinically significant GI and GY relationships, however, age seemed to be an effect measure modifier, with the 18-28 year age group having an average GI and GY odds ratio morbidity association of 4.7, the 29-38 year age group showed a 3.1 average odds ratio, and the 39-48 year group

[133] Robin Bowcock, mental health lecturer at WSU. Private communication, 2016.

showed a 2.8 odds ratio.[134] The averaged odds ratio was 3.5, so we can see that younger and older women were on either side of the average.[135] For dysmenorrhoea, these results fall in line with the consensus of the global literature showing that dysmenorrhoea improves with age (Weissman, Hartz, Hansen & Johnson, 2004; Burnett et al., 2005; Patel et al., 2006; Ohde et al., 2008; Pitts, Ferris, Smith, Shelley & Richters, 2008; Parker, Sneddon & Arbon, 2010; Nohara et al., 2011; Tavallaee, Joffres, Corber, Bayanzadeh & Rad, 2011; Ju et al., 2014a). Greene, Stratton, Cleary, Ballwed and Sinaii (2009) found that adolescent women with CPP waited 5.4 years to receive a diagnosis, nearly three times that of older women.[136] One interview participant in this study was not properly diagnosed and treated for over 20 years, as she was never believed. Mann et al., (2013) found that the main internal health concerns for young women were related to dysmenorrhoea and issues with bowel movements, both of which contributed to poorer self-assessment of mental health.

Severe dysmenorrhoea was experienced by 52% of the sample. While this result may seem high, it is most likely due to the significant occurrence of endometriosis in the sample.[137] The prevalence of dysmenorrhea in Australian women has been estimated to 60% (Ju et al., 2014b), 72% (Pitts et al., 2008), 75% (Ju et al., 2014a), 80% (Hillen, Grbavac, Johnston, Straton & Keogh, 1999) and up to 90% (Wilson & Keye, 1989; Weissman et al., 2004; Osayande & Mehulic, 2014). However, in its extreme form, dysmenorrhoea presents

[134] As shown above, GI and GY relationships are tightly entwined with mental health. Looking at this from an age perspective, it has been found that around 30% of young women experience depression (Taft & Watson, 2008). The findings from this present study show that 32% of the 18-28 year age group had moderate to severe feelings of anxiety or depression.

[135] Looking at GY disease diagnosis, 28% of the younger group, 27% of the middle group and 22% of the older group were diagnosed with PCOS, whereas 84% of the younger group, 27% of the middle group and 61% of the older group were diagnosed with endometriosis or adenomyosis. For full data on endometriosis or adenomyosis data see Table B.30 in Appendix B.

[136] See also: Mann et al., (2013).

[137] See Tables B.30-30a and Graph B.30a in Appendix B.

in around 20% (Harlow & Campbell, 2004; Dennerstein et al., 2012; Ju et al., 2014b), to 40% of women globally (Kunnamo, 2005), and even as low as 15% in Australian women (Pitts et al., 2008). The present sample percentage of 52% could suggest a biased sample, skewing the data towards the severe through the preponderance of endometriosis sufferers within the sample. The large number of participants with endometriosis acted as an effect measure modifier, showing that severe period pain often associated with endometriosis compounded the results of GI/GY comorbidity.

Removing endometriosis from the analysis, however, shows that the disease is an effect measure modifier on GI/GY interaction, rather than a confounder. The large cohort of those with endometriosis allowed for a nested study within the total sample, showing specific GI/GY, fertility, gestational and mental health variables associable with the disease (Table B.30 in Appendix B.). This data may provide a viable screening platform for physicians to assess the likelihood of endometriosis in their patients, and furthers the works of Seaman et al., (2008), Maroun et al., (2009), Meurs-Szojda et al., (2011) and Issa et al., (2012) discussed above.

By considering full GI and GY symptoms this could facilitate a better understanding of women's suffering. The various 'players' specialising in women's health could form a team with a shared goal. See, for example, Ek et al., (2015) and their discussion on medical 'teams'. This 'team' approach has proven effective for one survey participant, Anna (pseudonym), whose medical team all communicate together which has resulted in a far better support network for her (full reporting on this and other interviews to come at a

later stage). This proves that improvement in medical care is possible.[138] Unfortunately, it is the exception (the only exception in this sample) rather than the rule.

Beyond individual disease states, the GI/GY relationship, according to the pilot study and this larger study's samples, is a prevalent and prominent linear issue regarding women's health, both clinical and epidemiologically. The pilot study showed the same linear relationship, however here, the larger sample has increased the relationships between certain GI and GY variables considerably. In the pilot study (n=485) the dysmenorrhoea and constipation comorbidity odds ratio was 2.3 (95% CI 1.4:3.8, p=0.002) compared to this study showing an odds ratio of 3.5 (95% CI 2.7:4.6, p=<0.001). The nausea and/or vomiting odds ratio was higher in the pilot study; 4.2 (95% CI 2.1:8.3, p=<0.001) compared to this study, 3.3 (95% CI 2.6:4.2, p=<0.001). Both reflux/heartburn and IBS associations were greater in this study. Overall, the patterns remain consistent over both studies.[139] Dysmenorrhoea as a primary variable of investigation cannot be seen in isolation to its comorbid associated menstrual symptoms. A complex interaction between menstrual variables is evident in the data, indicating important considerations for the treatment of dysmenorrhoea.

This is especially true when considering the burgeoning business of infertility. The association between dysmenorrhoea and infertility (OR 1.7, 95% CI 1.3:2.2, p=<0.001) replicates the results of the pilot study (OR 1.9, 95% CI 1.0:3.6, p=0.04) with greater statistical and clinical certainty.[140] Munsell et al., (2010) found that inflammatory bowel

[138] See also: Abercrombie and Learman (2012) and Mellado et al., (2016).
[139] Interestingly, as discussed above in regards to age as a *confounder* or *modifier* of comorbidity correlations, even when we break up this larger study into age categories (making two similar sample sizes to the pilot study and one larger one) we continue to see the same patterns emerge. This could influence further research when designing and planning for sample sizes. See graphs B.1-3 in Appendix B.
[140] See Table A.8 in Appendix A for relevant pilot study data.

disorders were *not* associated with infertility, and this present study also found no significant correlations between women with IBS and infertility.[141] Despite the definition offered in the survey, women often responded 'no' to IBS in the previous year, however then listed IBS as a symptom associated with PMS. This could indicate a reliability issue with the term and measurement of IBS, while the more specific indicators of GI dysfunction, such as constipation, diarrhoea, bloating, nausea and reflux may be more precise. Indeed, this study found that infertility *was* associated with the GI variables of constipation, bloating, abdominal pain and reflux.[142]

Both the pilot study and this present study have shown a relationship between dysmenorrhoea and morning sickness. Both studies also indicate a relationship between pregnancy headaches and morning sickness (pilot study: OR 3.4, 95% CI 1.7:6.7, p=<0.001 and this study: OR 2.6, 95% CI 1.7:3.8, p=<0.001). Other menstrual symptoms associated with morning sickness in this sample were irregular menses and ovulation pain. Pregnancy constipation, diarrhoea, headaches, migraines, and pregnancy anxiety or depression were all positively associated with morning sickness. A history of dysmenorrhoea was positively associated with gestational constipation, while menstrual clotting was negatively associated. This further highlights an interaction between systems, with varying correlational relationships, and their impact beyond fertility and gestation and into the post-partum period.

Breastfeeding rates have been shown to be lower in women with inflammatory bowel disorders (Kane & Lemieux, 2005; Munsell et al., 2010). Chojenta et al., (2016) show how depression is associated with breastfeeding for *less* than six months. The Australian

[141] See also Baird et al., (1990) and Hudson et al., (1997).
[142] See Table B.31b in Appendix B for all infertility related variables.

Infant Feeding Guidelines suggest a minimum of six months and ideally twelve months of breastfeeding (National Health and Medical Research Council, 2003; Binns, Fraser, Lee & Scott, 2009), yet analysis from 2013 shows that less than 30% of infants are breastfed until twelve months, far less than the international standard recommending 24 months, due to potential socioeconomic and education issues (Hure, Powers, Chojenta, Byles & Loxton, 2013). In this present study findings, while menstrual flow heaviness *was* associated with difficulty breastfeeding, no association was found between light menstrual flow and difficulty breastfeeding in this sample. A light menstrual flow could indicate a 'deficiency of Blood' according to CM, a pattern also prevalent in those with difficulty in producing enough breastmilk. Yet, a heavy menstrual flow, shown here to be correlated with breastfeeding difficulty, can also be related to and cause 'Blood deficiency' (Maciocia, 1998; Lyttleton, 2004). Dysmenorrhoea severity was also associated with difficult breastfeeding, along with miscarriage in any trimester, ectopic pregnancy and the likelihood for birth complications or interventions.[143]

Many factors showed an association to birth interventions or complications, such as period pain medications (OR 1.4, 95% CI 1.0:2.0, p=0.03) and clotty menses (OR 1.6, 95% CI 1.1:2.3, p=0.01), diarrhoea (OR 1.4, 95% CI 1.0:1.9, p=0.05) and reflux/heartburn (OR 1.4, 95% CI 1.0:1.9, p=0.03), anger (OR 4.1, 95% CI 1.6:11.0, p=0.005) and rumination (OR 1.4, 95% CI 1.0:1.9, p=0.04), morning sickness (OR 2.7, 95% CI 1.9:3.9, p=<0.001) and difficulty breastfeeding (OR 1.4, 95% CI 1.0:1.9, p=0.04). Amongst these variables, the association with pain medications is quite interesting. Opioid drugs were commonly listed

[143] How society and culture have and do frame our perceptions of menstruation and childbirth will be discussed in the second stage of this project. See Wilms (1992) as an example: "The process of bleeding during menstruation and childbirth, in early matriarchal societies seen as a privilege and source of special power for women, came with the advance of patriarchies to be regarded more and more as a great potential danger for the life of the whole community." (p.18).

by this sample as being used for their dysmenorrhoea. That GI and GY, and their comorbidity, are associated with issues surrounding birth, should improve our understanding and future research directions regarding the *business* and medicalisation of the birthing process.

Opioid use for chronic pain (notably—*pelvic pain*) is highly prevalent in women's health conditions even though there is very little evidence to support their use (Kalso, Edwards, Moore & McQuay, 2004; Furlan, Sandoval, Mailis-Gagnon & Tunks, 2006; Martell et al., 2007; Noble et al., 2010; Sullivan & Ballantyne, 2012; Darnall et al., 2012). Indeed, the adverse effects, addiction and deaths occurring due to opioid use have been labelled an "…urgent medical and social problem." (Chapman et al., 2010). Women with comorbid endocrine disorders are more commonly treated with opioids than men (Cicero et al., 2009; Darnall et al., 2012), and opioids have been shown to impair endocrine function and sex steroid balance in women (Abs et al., 2000; Daniell, 2008; Vuong, Van Uum, O'Dell, Lutfy & Friedman, 2010). Norah (pseudonym), a survey participant interviewed regarding her case for the second stage of this study, was taking 320 5mg Percocet tablets a fortnight (nearly triple the commonly recommended dose).

Another treatment for dysmenorrhea other than opioids is the OCP, yet this medication comes with its own risks, such as an increased relative risk (RR 1.46) of developing CD (Cornish et al., 2008).[144] It has been noted in the literature that women who take the OCP for reasons *other* than contraception were more vulnerable to depression (Duke et al., 2007:27). Testing this here replicates the findings of Duke and colleagues, as using the OCP for reasons other than contraception (such as to regulate menses or deal

[144] Heitkemper et al., (2003), however, in their prospective daily diary study found no difference in GI symptoms related to OCP use. Crosnes, Carbonnel, Carrat, Beaugerie and Gendre (1999) also found no association between the OCP and worsening CD.

with acne reported by 146 respondents) had a higher relative risk of anxiety or depression (RR 1.1, 95% CI 1.0:1.1, p=0.03) than those who used them for contraception (n=369). Yet there are not many biomedical treatment options for women with severe dysmenorrhoea, especially those with endometriosis, who often have to look to surgery.

Sixty percent of the present sample had undergone some form of GY surgery, which was mostly related to investigation, diagnosis and treatment of endometriosis. It was once considered that a hysterectomy would cure endometriosis, a hypothesis now largely refuted (EndoActive Australia & NZ, 2015). One percent of this current cohort had undergone a hysterectomy. Istek et al., (2014) suggest that 12% of hysterectomies performed in the United States are due to CPP. It is suggested that around one in five Australian women will have a hysterectomy by the age of 50 (Graham et al., 2008), a number far greater than found in this present sample, despite the high level of GY morbidity. This could be due to the socioeconomic demographics of this sample, as it has been shown that there is a relationship between SES and hysterectomy rates (Cooper et al., 2008). Further analysis on the hysterectomy data obtained should look at separate ages of menarche and compare these to rates of hysterectomy. Weber et al., (1995) found 18% of women with IBD had undergone a hysterectomy, half of whom were 35 years old or younger. Barnhart (2011:2200) suggests earlier menarche may impact women's 'overall reproductive competence', such as primary ovarian reserve. Along with socioeconomic issues, Wilson and Mishra (2016) found that there was a reduced risk of hysterectomy with increasing age of menarche. Interestingly, Patel et al., (2006) found in their similarly sized survey (n=2262) of 18-45 year old Indian women that increasing age of menarche (>14 years of age) was protective of dysmenorrhoea (OR 0.7, 95% CI 0.5:0.9) while Osayande and Mehulic (2014) suggest menarche before 12 years of age as being a risk

factor for dysmenorrhoea (OR 1.5); this would also be an interesting area of further research for this dataset.

As discussed, symptoms of anxiety or depression were associated with all GI and GY variables measured, either in general or specifically related to emotions during gestation.[145] This is not the first study to suggest such correlations. Koloski et al., (2013) showed how constipation was related to higher levels of self-reported depression, with constipation being associated overall with poor health outcomes. Abdominal pain has been suggested as an independent predictor of suicidal behaviour.[146] It is also noted in the literature that IBS patients are more likely to suffer psychiatric illness (Pickett-Blakely et al., 2010; Nellesen et al., 2015), a phenomena seen from paediatrics onwards (Keethy, Mrakotsky & Szigethy, 2014).[147] This is taken further, with findings that link IBS to a history of physical, sexual and/or emotional abuse (Drossman et al., 1995; Talley, Fett & Zinsmeister, 1995; Drossman, 1997; Ali et al., 2000), a finding specifically associated with women (Jemelka & Russo, 1993; Delvaux, Denis & Allemand, 1997). Jarrett et al. (1998) show how IBS has a 40% correlation with daily psychological distress. Thus, removing variables from their (social) environment and onto paper, as done in this study, can be misleading:

[145] This is highly relevant, particularly in relation to gestation. Antidepressant use during pregnancy has been suggested to be associated with an increased risk of the offspring developing attention deficit hyperactivity disorder (Clements et al., 2015) and autism (Thompson, 2015).
[146] See also: Guthrie et al., (2003), Miller, Hopkins and Whorwell (2004), Spiegel, Schoenfeld and Naliboff (2007), Grzesiak et al., (2013) and Bengtsson and Ohlsson (2013).
[147] See also: Whitehead, Palsson and Jones (2002), Garakani et al., (2003), Si, Wang, Chen, Sun and Dai (2004), Mearin et al., (2006), Ladep, Obindo, Audu, Okeke and Malu (2006), and Whitehead et al., (2007). The hypothesis that IBS symptom severity is correlated with levels of anxiety or depression is refuted by de Castro, Miller, Carruthers and Whorwell (2015).

> "…the risk of moderate–severe dysmenorrhoea
>
> was associated with the experience of violence (OR 2.23, 95% CI 1.5–34)…"[148]

It is suggested that from adolescence, women are twice as likely as men to exhibit a depressive disorder, due to issues such as sexual abuse, eating disorders, and a plethora of physiological and psychosocial factors (Rubinow & Craft, 2012).[149] Women are also more exposed to certain forms of (often hidden) physical and mental violence, which can lead to, among other things, rape, unwanted pregnancies, abortions and sexually transmitted diseases, with up to 69% of women experiencing sexual and/or physical abuse in their lifetime (Kreinin, Esteva, Pfaff, Lusweti & Shauri, 2012). Nearly 50% of girls under 15 years of age have reported being forced to do something sexual against their will (García-Moreno, Jansen, Ellsberg, Heise, & Watts, 2005).

Pain is more complicated than the comorbidity presented in this present study, and requires a better (social) approach than a simple prescription. The literature suggests a bidirectional correlation between depression and opioid use, specific among chronic pain sufferers (Darnall et al., 2012), with opioids worsening symptoms of depression that already accompany painful conditions (Jensen, Thomsen & Højsted, 2006), and women with recent episodes of depression being more likely to be prescribed opioids (Hay et al., 2009; Colvin & Fallon, 2010; Konopka & van Wijhe, 2010). Thus physiological and psychological pain are intimately interrelated and interdependent. Embracing the psyche soma dichotomy, however, remains the norm in research; Burns et al., (2015) found that

[148] Patel et al., (2006:453). See also: Gordley, Lemasters, Simpson and Yiin (2000), Titilayo et al., (2009), Tavallaee et al., (2011) and Ju et al., (2014a) for associations between depression and dysmenorrhoea.
[149] See also: Kessler, McGonagle, Swartz, Blazer, and Nelson (1993), and Weissman et al., (1996).

women's mortality was associated with their physical health rather than their mental health.

It has been a prevalent assumption in both Eastern and Western medical traditions that women are vulnerable, fragile and emotional, all of which make 'them' difficult to treat.[150]

Women are subordinate to men and are not masters of their own affairs.
Therefore, their diseases are mostly [due to] anxiety, thinking,
resentment, and anger, with depressive qi damaging the feelings.
Hence, menstrual diseases due to the seven affects are many.

Ye Heng-yin (19th Century)[151]

"I have heard the talk of doctors, they say,
'I prefer treating ten men to treating one woman.' "

Zhu En (postscript to Miscellaneous Records of a Female Physician)[152]

Early Greek medicine reveals a similar gendered understanding of female emotive frailty,[153] as the word uterus (*hustera*) was used to coin the term 'hysteria', as female emotional liability was seen as arising from the uterus (Block, 2010); hence the term *hysterectomy*.

…the womb played a key role in the etiology of nervous disorders...
the womb was an irascible and tyrannical organ…
which disrupted the bodily functions, irritated the nerves
and ultimately produced aberrant mental behavior.

Laura Fleder on Diderot (20th Century)[154]

[150] See Furth (1999), Wu (2010) and Campanella et al., (2012). This assumption has resulted in the conceptual normalisation of women's suffering (Barnach & Chrisler, 2007; Wainer & Wainer, 2012; Mann et al., 2013)
[151] As quoted in Cochrane (2015:5), from Ye (2001).
[152] Tan (2015).
[153] See also: Furth and Cochrane (2006).
[154] Fleder (1978:2) as quoted in Block (2010).

It is interesting to note that Tan Yuxian (one of CM history's most famous female physicians)[155] reports significant emotional turmoil in her women's health case histories, a fact not missed by her male counterparts. However, her reports differ from those of her peers:

> "Tán mentioned that anger was a contributing factor to the patient's disease in about a quarter of the cases. She often explained why – the husband wanted a concubine, the husband cheated people, and so forth. In *Míng* dynasty case studies written by males, anger was also frequently mentioned for female patients but no reason was usually given. In reading these cases, one gets the impression that women were simply angry by nature. Tán's cases provide some insight as to the reasons."[156]

Irrespective of which culture and society a woman arises from and resides within, her biological health can be adversely impacted by the society surrounding her and the culture of the research and medicine investigating and treating her.[157] As an example, 14% percent of the present sample experienced PND after at least one birth, which is comparable to current estimates of the Australian average rate of 15% (Chojenta et al., 2016).[158] Women who were home owners were 30% less likely to experience PND than those in other forms of housing, showing how social determinants can contribute to women's health. [159] Showing how internal health is intimately related to broader social relationships, Chojenta, Loxton & Lucke (2012) found that PND occurred twice as often in

[155] See Wu (2010) for a discussion on other female physicians of note in CM history. Their fame, however, came through the filial piety of *male* family members who published on their behalf. The cited 'pillars' of CM history are notoriously male, from Huang Di and Qi Bo, to Attendant He, Bian Que, Chunyu Yi, Zhang Ji, Hua Tuo, Huangfu Mi and Wang Xi (Lu & Needham, 1980; Brown, 2015).
[156] Tan (2015:23).
[157] History has been notorious in its demeaning analysis and interpretation of the feminine, which will be discussed at length in part two of this project. "Women draw out the *yang*…in things during the hours of darkness…" stated Attendant He during his prognosis of Lord Ping in the *Tradition of Zuo* (see Brown, 2015:27).
[158] For our present sample, feelings of *happiness* in the previous year were negatively associated with PND (OR 0.5, 95% CI 0.3:0.7, p=0.001) while *fear* was positively associated (OR 3.0, 95% CI 2.2.:4.1, p=<0.001).
[159] For example, see the work of Zuluaga and Andersson (2013), who found that women in Amazonian indigenous communities who completed traditional initiation rituals associated with menarche were less likely to experience dysmenorrhoea later (p=<0.001). This is an example of non-medical social impacts leading to a reducing in suffering.

women with a history of depression, with the primary influencing factors being the lack of "…affectionate support and positive social interactions…" (p.145). Framing this in context, Australian authors Westall and Liamputtong's chapter on the partner's experience of PND (2011:123-141)[160] sheds a stark light on the fear and uncertainty felt from the other side of the story:

> *"Living with uncertainty captured the men's experiences of living with someone with PND, and their fears about whether or not they would find their wife or children dead…Many of the partners struggled with depression themselves…" (pp.123-124).*

It becomes difficult, then, to clearly define gendered medicines approach to separating women's and men's health, as they are (often) socially intertwined and interdependent. This also becomes evident within the analytical approach to separating and isolating GI and GY variables, along with mental health and its association to…everything. Thus 'treatment', be it for PND or GI/GY phenomena must extend beyond medicalisation. Indeed, as shown above, PND is associated with both GI and GY variables.

凡欲診病者，必問飲食居處，暴樂暴苦，始樂後苦，皆傷精氣，精氣竭絕，形體毀沮。

Fán yù zhěn bìng zhě, bì wèn yǐnshí jū chù, bào lè bào kǔ,
shǐ lè hòu kǔ, jiē shāng jīng qì, jīng qì jié jué, xíngtǐ huǐ jǔ.

Every time one wishes to treat a patient,
one must inquire about their food and drink (diet) and about their dwelling,
[about their emotions]; if they have had violent joy, violent suffering, or first joy followed by suffering,
all of which injure the jīng qì, and when jīng qì is exstinguished,
the physical form is damaged and destroyed.

Huangdi Neijing Suwen chapter 77: 素問: 疏五過論[161]

[160] See also: Areias, Kumar, Barros and Figueiredo (1996), Meighan, Davis, Thomas and Droppleman (1999), Matthey, Barnett, Ungerer and Waters (2000), Ramchandani et al., (2005), Solantaus and Salo (2005) and Gutierrez-Galve, Stein, Hanington, Heron & Ramchandani (2015) for more on paternal PND.
[161] Malomlus Paa'ayat translation, Scholars of Chinese Medicine Facebook group, 4th May 2016.

Some research does look beyond the prescription pad, such as studies which demonstrate that increased physical activity is associated with a decrease in depressive symptoms (Heesch, van Gellecum, Burton, van Uffelen & Brown, 2015). However, the correlations between mental wellbeing and GY/GI dysfunction could be a confounder to their line of investigation. Heesch and colleagues (2014), while accounting for menopause, BMI, smoking and alcohol consumption, did not account for GY/GI dysfunction leading to reduced physical activity.[162] As their study utilised data from the Australian Longitudinal Study on Women's Health (which does ask about GI function and GY issues such as period pain and menstrual heaviness) these confounders could have easily been accounted for. This is relevant to future research in this area, as epidemiological strategies offering advice on an appropriate dose-response relationship of physical activity to ameliorate depressive symptoms could be insulting to women GI/GY compromised.

Regardless of the specific concern, be it visceral or psychological, women often feel disillusioned with the health approaches offered by biomedicine and turn to CM as an alternative (Zhu & Liu, 2016). It is suggested that CM is more 'holistic' than biomedicine (Cheng, Kuhlmann & Annandale, 2010; Facchinetti, Dante, & Neri, 2015), yet in its modern presentation, *Traditional Chinese Medicine* could be seen as more replicating biomedical constructs under the guise of tradition,[163] which has not answered the question of mixed

[162] For another example, see Hewett, Zazulak and Myer (2007) and their review of the risk of anterior cruciate ligament injury and the menstrual cycle.

[163] See, for example, the numerous works on electro-therapy in CM research, particularly relating to dysmenorrhoea and PCOS (Proctor et al., 2002; Zhang et al., 2011). See also Furth (1999:5). "Now the question of history for TCM practitioners like yourselves has an added complexity. You who are studying fuke/gynecology as a specialty in TCM do need to know something about the history of Chinese medicine so that you can recognise when your therapeutic approach is also based on Chinese sexist values that have shaped understanding about healing." (Furth & Cochrane, 2006:5). It could be argued that the move towards electro-therapy to zap a woman's system into action rather than seek the underlying (ben) vulnerabilities is a reflection of a sexist approach to (T)CM. See also Jaensch (2015b).

or inconclusive results in CM trials (Ernst & White, 1999:5; Manheimer, Ezzo, Hadhazy, & Berman, 2005; Moffet, 2008; Adams, Wu, Yasui, Aung & Vohra, 2012).

> "Western medicine and science have functioned as guiding lights in efforts by physicians and later the state to develop and modernize Chinese medicine, biomedical physicians and the scientific establishment generally perceive[e] Chinese medicine as an outdated practice."[164]

What can epidemiological observational research such as this present study offer the medical communities who sit on either side of the bridge of comorbidity? Is the trend of "…reduc[ing] women to a uterus and ovaries…" (Furth & Cochrane, 2006:7) at an end? In an article discussing *invisible illness* written by Rebecca Williams, a sufferer of chronic GI and GY comorbidity, she shows how "…women became invisible…the missing majority." (Wainer & Wainer, 2012:1).

> "I present as a physically-capable 29-year-old woman. I'm not in a wheelchair, I don't use crutches or other medical aids, nor do I have any obvious external symptoms. Yet, by definition, I am disabled. The reality is I suffer from a plethora of chronic health conditions—over a dozen in total—which produce a variety of symptoms, and leave me feeling anything but 'normal'. These conditions are what many are now calling 'invisible illnesses'…On the whole I'm thankful that I'm able to 'pass' as a 'normal', 'functional' person. It's a freedom that many with disabilities do not enjoy. I'm lucky that I can go outside without fear of being stared at, asked an ill-informed question, or worse still, harassed because of my disabilities. I'm also able to be confident that when I meet someone new, they will not recognise me as being disabled or unwell. I savour moments like this, when I appear to be just like 'everybody else'. And yet, there are times I wish people *could* recognise that I'm ill; when I wish how I'm feeling on the inside would manifest into an external symptom for the world to see."[165]

Along with symptom correlations, this study suggests associations for fertility, symptoms of gestation, birth interventions or complications, along with postnatal issues. In designing this research, the idea that the complexity of birthing issues could be reduced with

[164] Scheid (2014:110).
[165] Williams (2016).

quantitative data was critiqued as being 'typically patriarchal'.[166] However, there is considerable epidemiological ink spilled in an attempt to understand birth interventions and complications, and possible issues arising later in life in the offspring.[167] CM techniques have long been used to facilitate a safe birth process for both mother and child (Betts, 2006; Smith, Levett, Collins & Crowther, 2011; Levett, Smith, Dahlen & Bensoussan, 2014; Levett, 2015), and with the current study's suggestions of dysmenorrhoea, heavy and clotty menses, ovulation pain, diarrhoea, reflux and specific symptoms during gestation being associated with difficulty in labour we could look at improving these factors in the preconception window and during pregnancy.[168]

Of those women who experienced lower back pain with their menses (n=958), 79% of fertility concerns had been diagnosed as female factors and of the 458 of these women who had been pregnant, 40% had experienced a miscarriage and over 60% experienced frequent episodes of fear, worry or anxiety. Back pain, infertility, miscarriage, fear, worry and anxiety can all be related to issues of Kidneys in CM, showing how multiple issues (*biao*) can be traced to a primary source (*ben*) of disharmony. Treating the root is the primary focus of CM, and where its true preventive power lies.[169] As the role and goal of

[166] Private communication with childbirth advocate Lois Nethery, 2015-2016.
[167] See, for example, Schetter and Tanner (2012), Liou, Wang and Cheng (2014), and Jaensch (2015a).
[168] See, for example, the discussion on poor marital support and associated anxiety/depression during pregnancy by Gourounti, Anagnostopoulos and Sandall (2014).
[169] It has been found that the renal system, specifically that related to urinary incontinence, is correlated with depression (Mishra, Barker, Herber-Gast & Hillard, 2015). This relationship between the Heart and Kidneys (*Shaoyin*) and the Uterus (via the *baomai* and *baoluo* respectively), between physicality and emotionality, is fascinating when considered epigenetically. See, for example, intergenerational cascades of depression associated with the cardinal relationships of parent and child (Tooth & Mishra, 2013), and Liu Yuan's warning: "*Through the hard work of their forebears, their accumulated virtue and good deeds, so it is that these future generations reap some benefit. However, if our rash actions and thoughts lead us astray and we do not repent, all this accumulated virtue gifted to us from our ancestors is worn down and frittered away. Eventually we will encounter disaster…How many of us continue our traits of evil through our children?"* (Seidman & Jaensch, 2013:48-49).

epidemiological research is prevention (Webb & Bain, 2014:325), CM—ideally preventive medicine—should have a voice in public health investigations and resultant solutions.

Rather than simply showing patterns of disharmony or comorbidity in order to devise a new intervention, a true public health investigation would look beyond medicalisation (either with herbs, acupuncture, drugs, or scalpels), which is a challenge due to research opportunities being biased towards industry and a saleable 'product' (Stamatakis, Weiler & Ioannidis, 2013).

"I say: Ah!
This is the heart of benevolence!
…People are sick in their bodies,
but the larger disease is in the heart-mind;
in the same way,
someone who does not give herbal medicine
can still be called a doctor."

Fàn Qìng (1548)[170]

A physician needs to act in order to assist the suffering patient, seeing someone drowning they drag them out—the rescuer. Yet suddenly there's another person flailing in the water 'downstream', and another, and another. Each time a sufferer is dragged out of the river, the physician has to dive back in. The researcher, however, has the opportunity to look 'upstream' and see what (or who) is pushing people into the river. Why are people falling in? Why can't they swim? These questions go beyond the prescription pad and seek the true heart of medicine.

[170] As quote in Jǐ (2016:26).

> One night the ship foundered in a storm. The scholar anxiously watched the crashing waves and held tightly to the mast. The sailor approached the scholar and asked him, "Have you, my good man, by any chance studied swimology?" In puzzlement, the scholar could only shake his head. "That really is too bad," said the sailor. "You have wasted your whole life, for the ship is sinking."[171]
>
> Buddhist story

[171] Retold in Seidman & Jaensch (2013) and Jaensch (2014) from Feldman & Kornfield, (1991:252).

Scope and limitations:

The associations found add to previous research around GI and GY relationships, and with further analysis of probability samples greater generalisability and clinical significance may be ascertained. Despite the extensive literature on the topic of systemic interactions, medical practice and specialisation often neglects this reality when it comes to treatment and management of women's health. The story of one of the first experimental studies ever conducted is instructive in the historical observation of changing entrenched medicine. Even though James Lind proved that scurvy could be prevented in sailors by including oranges and lemons in their diets, it took the British Navy 40 years to implement any changes (Aschengrau & Seage, 2014:11-13). Further data replication would have potential implications for the development of initial-encounter decision aides and clinical guidelines. From the qualitative interviews so far conducted, inter-disciplinary and speciality communication is a consistent theme:

> *"…you need a good medical team who will talk to each other. I think that is one of the greatest things you can do. I have an amazing GP, gynaecologist, pelvic floor physiotherapist and psychologist, who all talk to each other; they're 'team Anna'. You need good people in your corner."*[172]

From a CM perspective, this research demonstrates individually observed patterns occurring repeatedly in a community of reproductive aged women. On a medical level, this research demonstrates the importance of the CM investigation prior to prescription of (individualised) treatment, where GI variables are integral to treating GY complaints, and

[172] From Anna With The Vogue Magazines (participant-chosen pseudonym). Full interviews and analysis to be completed in the second stage of this study.

vice versa. When considering these present findings alongside that of Smith et al., (2014), CM physicians could be further encouraged to discuss dietary circumstances (and GI health in general) with their GY clients.[173] On an epidemiological level, patterns of GI/GY disharmony extend *beyond* 'inter-individual variability' (Mogil, 2012), demonstrating the scope and perhaps role for CM practitioners, and how their research and influence may extend beyond the treatment room and into the sphere of public health. Nowhere is this more evident in how fertility is treated, with epigenetic transference opening the window to the impacts of appropriate and inappropriate medicine(s). Yet this same strength—confirming the reality of *bianzheng*—is a weakness. What does this tell us we can actually *do* for Anna With The Vogue Magazines and women like her? For individual medicine, what is the drug, the surgery, the herb or acupuncture point that will provide them relief, hope, freedom from pain? As discussed above through the work of Scheid (2014) and others, CM patterns can lead (for better or worse) into further (*bio*)medicalisation.

CM certainly had and has a role to play in medicalising women's health (Furth & Cochrane, 2006), yet, how is this to be implemented appropriately and accepted into the public's medicine? As discussed recently by Gries (2016), the means by which modernity hopes to 'prove' the efficacy of CM, namely, the randomised controlled trial (RCT), can be considered problematic.[174] Despite a millennia or more of empirical evidence, the integration of CM into contemporary medical healthcare falters. The medicine-science of our era is influenced by works such as that of Ernst, Lee and Choi (2011), who critique acupuncture trials, and the therapy itself, as being unproven and even unsafe for use in

[173] See Davies, Crowder, Reid and Dickerson (1986) and Bharadwaj et al., (2015) for more on diet, the bowel and the impacts of luteal phase progesterone.
[174] This could be related to the way the research question is posed. Consider, for example, if rather than 'does acupuncture improve ART success rates' the question was posed 'what ART procedures improve acupuncture success rates'.

the treatment of pain. For women's health, the prevalence of GI/GY comorbidity shown in this present study could increase its possible scope of influence, leading toward possible avenues of improved further research. This could relate to choice of interventions, such as using acupuncture points which are suggested in the literature to have an impact on both systems, or herbal medicine strategies that take both systems into account.[175] That individual GY symptoms, such as dysmenorrhoea, are clearly related to other symptoms such as heaviness and clotting, show how researchers could account for the overall impact of the CM intervention more correctly if *each* symptom was measured before and after the treatment. While dysmenorrhoea may (only) improve by a small margin over a three-month trial, such as that conducted by Witt et al., (2008), the use of an average daily pain scale could be incorporated with other measures such as perceived menstrual heaviness, clotting, and PMS scales, may all contribute to a greater accumulative, aggregated difference between groups.

There are several limitations to epidemiological research, particularly in relation to the establishment of causation. While epidemiological research cannot prove causal relationships, it can suggest the existence of possible causal links. Even controlled trials can only make inferences about cause and effect (Broutet et al., 2016), thus implicating a persistent theme of uncertainty within both medicine and public health.

[175] Yeo, Rose, Bosch, van den Noort and Lim (2016) have recently found that acupuncture has a gendered effect modulated by male and female brain structure.

" 'When are you going to get the real answer?
What more research should be done?'
Neither the media nor the public have grasped the fact
that some critically important questions are unanswerable,
either now or in the foreseeable future.
We all need to learn how to deal with uncertainty…
Unfortunately, humankind cannot bear much uncertainty."

Geoffrey Rose[176]

This study has been looking for specific clinical case phenomena in a community based sample—patterns of correlation not causation. Two key areas weaken this study, non-probability sampling and distribution method. By using non-probability self-selecting sampling, we were able to access a community based cohort rather than one based on pre-existing morbidity, as has been demonstrated in the past. In no way is this sample representative, thus reducing the generalisability of our results to *all* women of reproductive age. Seeing that our data supports previous research findings in this area, which incorporated probability samples, this lessens the sample specific concerns regarding our results. Significant odds ratios and confidence interval were found for many variable relationships, however, some results must be considered as exploratory and generate further research due to a confidence interval including 1.0 (thus a possible null difference between groups), or relatively wide confidence intervals, such as the relationship between PND and PMS mood changes. This specific association had an odds ratio of 10.1, yet the 95% confidence interval was 2.4:42.9 with a probability value of 0.002. Thus we can be quite sure that the real association lies somewhere between an increased odds of comorbidity lying between 2.4 to 42.9. The way this confidence interval can be viewed is either, it shows an unstable method of measurement with little reliability,

[176] Rose (1992:56)

or, rather, it shows that the potential clinical significance of this relationship could be as high as someone with PND being nearly 43 times more likely to suffer PMS mood changes (or vice versa).[177] A further difficulty in understanding the relevance and applicability of these results is that this study cannot ascertain the temporal nature of these relationships (does PND predate PMS mood changes?), just that a relationship exists. The broad categories of anxiety, depression and PND may have been viewed and expressed differently amongst the sample, and the lack of ascertaining direct clinical diagnoses (which was not possible using this research method and design) reduces our certainty and measurement reliability. Having said this, the results show a significant association between somatic and mental health.

Even though we sought a community based sample, those actively seeking to participate in our research (and thus likely to be key contributors to its distribution) were those with a diagnosed GY morbidity (of note, endometriosis). Endometriosis is assumed to affect around 10% of women in the community, while in our sample over a third of our sample had the disease (n=724). This may indicate a possible self-selection responder bias impacting our comorbidity data, meaning our results specifically relate to those with endometriosis rather than women in general, with results skewed towards their symptomatic circumstances. Efforts to account for this in the data show GY disease diagnosis to be a modifier (increasing the relationship) rather than a confounder. The levels of comorbidity found in this study in relation to endometriosis could inform future approaches in its diagnosis and treatment, specifically in regards to younger women. Moawad, Guido, Ramanathan, Mansuria and Lee (2011) along with Unger and Laufer

[177] Paul Fahey, private communication 2016.

(2011) have shown how endometriosis may be a progressive disease, with earlier intervention possibly lessening its impact.

When considering mental health, it is suggested that 12.5% of Australian women report experiencing anxiety disorders (Cochrane, 2015). Of the current survey respondents, (who are not geographically defined), over 75% reported either severe (16%) or moderate to mild (60%) experiences of anxiety, depression, irritability or mood swings in the previous year. This could suggest that women with a higher level of mental health concerns are more likely to respond to a survey such as this. It could also be a reference to the sample characteristics of period pain, with over 82% of respondents experiencing some level of discomfort.

Using an online survey allowed for quick and financially plausible distribution. It also allowed the research to extend internationally. This however limited the research to those actively utilising the internet, specifically social media sites that were used to promote the survey (primarily Facebook and Instagram). Along with this, funding limitations meant that the survey was distributed in English only. This may have impacted the amount of SES data available in the survey, as those with lower SES may have been less likely to encounter the survey. As a retrospective study, recall bias may be implicated, however this is limited through analysing data from only those women who were currently menstruating, are within the reproductive age range, limiting the inquiry to the previous six months. Using a non-probability naturalistic convenience snow-ball sampling method limited the generalisability of results. The total population of the sampling frame is known, thus allowing for a discussion of non-responder bias. External reliability is limited through the inclusion of only those women with internet access. The level of attrition, due to whatever cause, may suggest a responder bias or an attrition bias, and could impact the

internal validity of the study. As with all anonymous online surveys, the credibility of respondents is unknown, with possible inclusion of dummy responses. However, seeing that nearly one thousand respondents left their contact details makes this unlikely.

Women were asked to subjectively respond to symptom questions, revealing a vulnerability of defining severity (what is severe to one woman may be experienced as moderate to another). From a CM perspective, this is irrelevant, as it is the patient and her personal experience of herself that is of concern. This is an interesting area that separates public health investigations and assumptions compared to individual medicine. While we have shown odds ratios for comorbidity, this does not mean that women without *X* did not experience *Y*. This individual experience is to be explored in later phases of this research.

Conclusion:

"There is only medicine,

and it is either effective medicine or defective medicine."[178]

From the *biao* of observed clinically comorbidity, we have sought its reflection in the realm of public health, and hope to find the *ben* of what is at the heart of GI and GY vulnerability. This study has quantitatively illustrated the complexity of the GI and GY relationship, and its potential impacts on fertility, the viability and symptoms of gestation, obstetrics and mental health. To compensate for the weakness a non-probability convenience sample presents, it is hoped that further research will utilise a representative sample of women to ascertain if these present results (and those of the pilot study) can be replicated. If so, the *bianzheng*-comorbidity construct could be used to facilitate both CM and biomedical research and therapeutics. By treating GI and GY symptoms as being part of the same underlying phenomena, it may be possible to reduce infertility, risk of miscarriage, symptoms during gestation, birth interventions and complications, PND, difficulties breastfeeding, and improve women's mental health. It is hoped that this work, by bringing together dusty records of the previous three decades in biomedical literature and adding to their findings, will narrow the gap between what is known about GI and GY relationships and how women are treated for them. As Professor Clancy articulated, "…there is this connection, the body works as a whole, not as separate entities…".

Yet understanding the paradigm foundations of both biomedical and CM health systems requires a quantitative investigation into a gendered medicine and inherent

[178] Seidman & Jaensch (2013:1).

pernicious patriarchy. The body works as a whole, not as a separate entity to the environment, society and culture surrounding it—not surrounding—*imbuing* 'it'. These themes, and how they influence the understanding (and thus treatment) of women's health will be explored in the second stage of this research, which seeks the human voice to illuminate the data. From a community survey, to interviewing a morbid community of women suffering severe GI/GY morbidity, clarity is sought in order to frame further clinical research and appropriate interventions.

When using epidemiological means to show patterns of disharmony, one encounters the divide separating personal medicine and public health. Whether hormonal, neural or CM conceptual frameworks are employed, none address the upstream features of social health, and by definition perpetuate the medicalisation of everything. The results of this research, along with other attempts at bridging CM with biomedicine using the comorbidity-pattern differentiation argument, could simply result in a new polypharmacy—the pill combined with a laxative. Yet these avenues of answering women's health concerns fail to address underlying vulnerability and fail to cultivate and encourage resilience.

From Karen (pseudonym), an interview participant:

> *"If I tell them that I'm in pain they just tell me to sit in a quiet room and close my eyes and go to my happy place. When I'm in pain my happy place is stabbing people. You know what I mean? My happy place is a violent, violent place, because I'm in pain, I can't focus on anything else. I can't get my mind off the pain. My GP wants me to talk to someone about the pain, but I don't want to. I know that they won't understand. My husband is ok, to a point. He's there for me, but he doesn't know how to help me. He wants to stop what's happening to me but he can't, so he gets frustrated too. He tells me to get out and go for a walk, do some exercise, but he doesn't know that it hurts. We get in big arguments all the time. Sometimes I need to go to the toilet, but I just wish I could wear a diaper, one of those adult nappies. Just getting up to go to the toilet causes so much pain, it just feels like I'm tearing. So I just hold on for as long as I can, but I have to go eventually."*

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Glossary:

The definitions used to guide participants during the WSU online survey are listed below in chronological order. These definitions can also be found in the full survey instrument included in Appendix C.

Constipation:	*difficulty in passing stools: either infrequent and/or incomplete and/or slow and/or hard stools.*
Diarrhoea:	*the frequent passage of loose, watery stools.*
Bloating:	*feeling swollen and/or distended in the abdominal region.*
Abdominal pain:	*any discomfort felt between your ribs and your pelvis.*
IBS:	*the combined experience of bloating, abdominal pain and varied bowel habits.*
Nausea:	*feeling sick in the stomach, not wanting to eat, and feeling like you may vomit.*
Vomiting:	*to eject the contents of one's stomach out through the mouth.*
Reflux/heartburn:	*a burning sensation in the stomach, often extending up towards the throat, and/or a burning feeling in the chest, sometimes associated with an acidic taste in the mouth.*
GI surgery:	*could be, but is not limited to, that which affects your: oesophagus, stomach, liver, gall bladder, pancreas, small intestine, appendix, large intestine and/or rectum.*
Heavy periods:	*also called menorrhagia, a condition where menstrual blood flow is very heavy (more than 80mls of blood per month), requiring frequent changing of menstrual pads or tampons to avoid leakage, including during the night.*
Clotty menstrual flow:	*menstrual blood containing semisolid gel-like clots. Clots can be very small or large.*
Migraines:	*a severe headache which last for hours or days, often preceded by visual disturbances, strange tastes or smells, numbness, and/or dizziness. May be accompanied by nausea, vomiting, chills, frequent urination, sweating, swelling, and fatigue.*
GY conditions:	*such as polycystic ovaries (PCO) or syndrome (PCOS), endometriosis, adenomyosis, fibroids, cysts, polyps, abnormal pap smear results, and amenorrhoea (no periods).*
GY surgery:	*such as a laparoscopy, ablation or excision of endometriosis, hysterectomy, ovaries removed, removal of abnormal cervical cells, dilation and curettage (D&C) and tubal ligation.*
Infertility:	*difficulty conceiving for 12 months or more*.
ART:	*the technology used to achieve pregnancy with procedures such as fertility medication, artificial insemination, in vitro fertilization (IVF) and surrogacy.*

Appendix A: Pilot study results.

Over two months (February and March 2014) 471 women responded to a pilot study survey to test for gastrointestinal and gynaecological associations. Summary results are as follows:

Descriptive statistics:

Table A.1. Sample age range

17	1 (0.2%)
18-24	25 (5.3%)
25-34	186 (39.5%)
35-44	156 (33.1%)
45-54	64 (13.6%)
55-64	30 (6.4%)
75+	8 (1.7%)
Total	471 (100%)

Table A.2: Dichotomised symptom percentages

History of symptom	n=(%)
GI Variables	
Constipation	
Yes	235 (49.9%)
No	236 (50.1%)
Total	471 (100%)
Heartburn/reflux	
Yes	163 (34.6%)
No	308 (65.4%)
Total	471 (100%)
Nausea/vomiting	
Yes	151 (32.1%)
No	320 (67.9%)
Total	471 (100%)
IBS/abdominal pain	
Yes	222 (47.1%)

No	249 (52.9%)
Total	471 (100%)
Loss of appetite	
Yes	132 (28%)
No	339 (72%)
Total	471 (100%)
GY variables	
Dysmenorrhoea	
Yes	379 (49%)
No	81 (17.2%)
Total	460 (100%)
Irregular periods	
Yes	231 (50.2%)
No	229 (49.8%)
Total	460 (100%)
Heavy/clotty periods	
Yes	326 (70.9%)
No	134 (29.1%)
Total	460 (100%)
Menstrual headaches/migraines	
Yes	215 (46.7%)
No	245 (53.3%)
Total	460 (100%)
PMS	
Yes	413 (89.8%)
No	47 (10.2%)

Total	460 (100%)
Ovulation pain	
Yes	247 (53.7%)
No	213 (46.3%)
Total	460 (100%)
Diagnosis of GY condition	
Yes	184 (39.1%)
No	276 (58.6%)
Total	460 (97.7%)
Use of the OCP	
Yes	358 (77.8%)
No	102 (22.2%)
Total	460 (100%)
Mental health	
Anxiety/depression/ irritability/mood swings	
Yes	358 (77.8%)
No	102 (22.2%)
Total	460 (100%)
Fertility and gestation	
History of infertility	
Yes	130 (28.5%)
No	326 (71.5%)
Total	456 (100%)
History of pregnancy	
Yes	324 (68.8%)

No	132 (28%)
Total	456 (96.8%)
History of IVF	
Yes	43 (9.1%)
No	413 (87.7%)
Total	456 (96.8%)
History of miscarriage/termination	
Yes	142 (30.1%)
No	314 (66.7%)
Total	456 (96.8%)
Morning sickness	
Yes	241 (74.4%)
No	83 (25.6%)
Total	324 (100%)
Pregnancy related headaches/migraines	
Yes	93 (28.7%)
No	231 (71.3%)
Total	324 (100%)
Pregnancy related reflux/heartburn	
Yes	196 (60.5%)
No	128 (39.5%)
Total	324 (100%)
Pregnancy related constipation	

Yes	160 (49.4%)
No	164 (50.6%)
Total	324 (100%)
Breech presentation	
Yes	38 (11.7%)
No	286 (88.3%)
Total	324 (100%)
Pregnancy related high blood pressure	
Yes	41 (12.7%)
No	283 (87.3%)
Total	324 (100%)
Pregnancy related diabetes	
Yes	25 (7.7%)
No	299 (93.3%)
Total	324 (100%)

Inferential statistics:

Graph A.1. Period pain severity and GI dysfunction

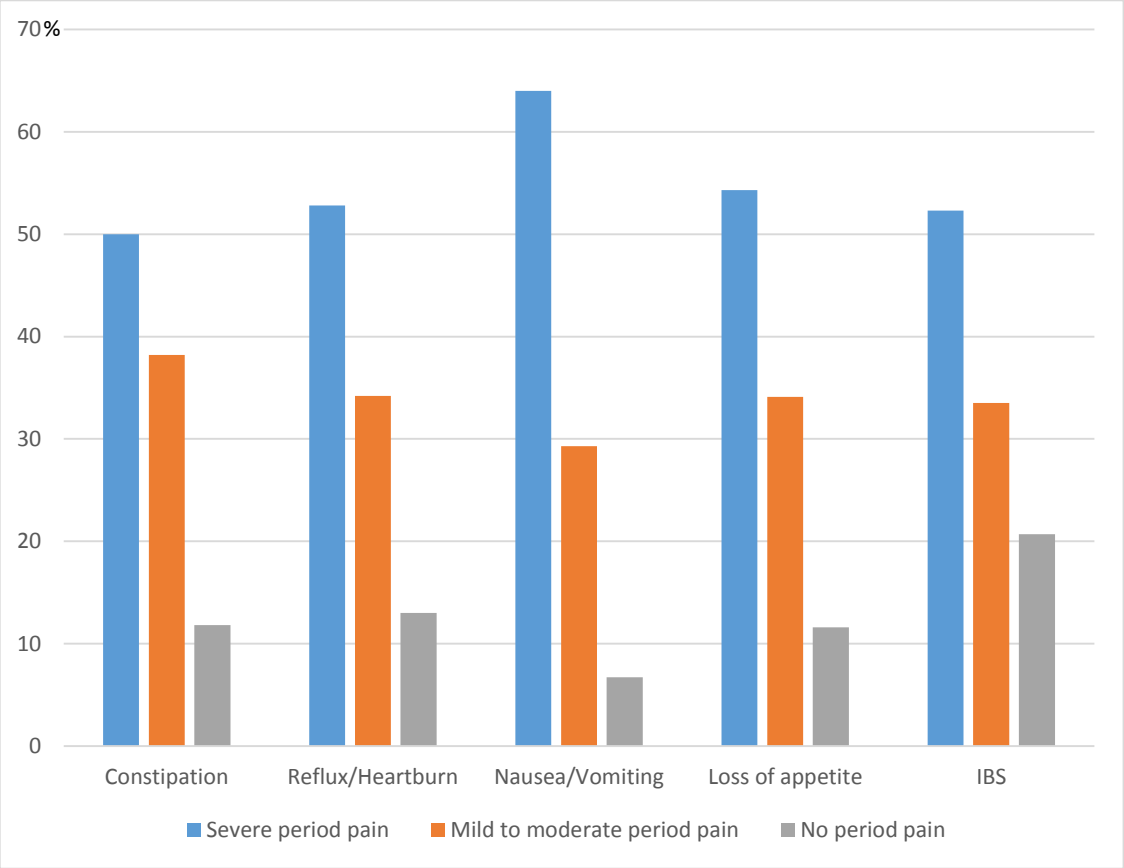


Table A.3. Dysmenorrhoea and constipation

			Dysmenorrhoea		
			Yes	3.00	Total
Constipation	yes	Count	201	27	228
		% within Constipation	88.2%	11.8%	100.0%
	no	Count	178	54	232
		% within Constipation	76.7%	23.3%	100.0%
Total		Count	379	81	460
		% within Constipation	82.4%	17.6%	100.0%

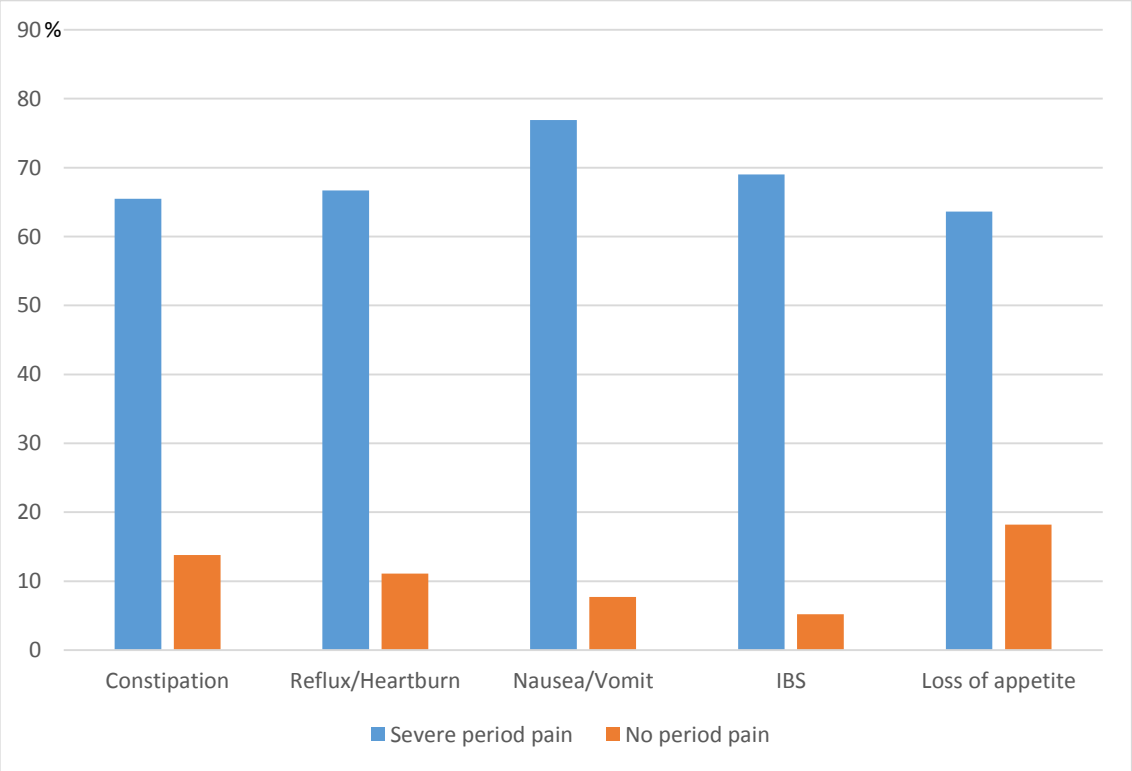
Table A.4. Dysmenorrhoea and nausea and/or vomiting

			Do you have a history of period pain?			
			Severe	Moderate/Mild	None	Total
Nausea/vomiting	Yes	Count	96	44	10	150
		% within Nausea/vomit	64.0%	29.3%	6.7%	100.0%
	No	Count	84	155	71	310
		% within Nausea/vomit	27.1%	50.0%	22.9%	100.0%
Total		Count	180	199	81	460
		% within Nausea/vomit	39.1%	43.3%	17.6%	100.0%

Table A.5. Dysmenorrhoea and GI symptom odds ratios

GI symptom	Odds ratio	95% CI	P-value
Constipation	2.3	1.4:3.8	0.002
Reflux/heartburn	1.7	1.0:2.9	0.06
Nausea/vomit	4.2	2.1:8.3	<0.001
IBS	1.6	1.0:2.6	0.072
Loss of appetite	1.9	1.03:3.5	0.038

Graph A.2. Severe period pain and no period pain related to severe GI symptoms*



*All of these relationships are significant (loss of appetite p=0.001, all others p=<0.001).

Graph A.3. Period pain and other menstrual symptoms

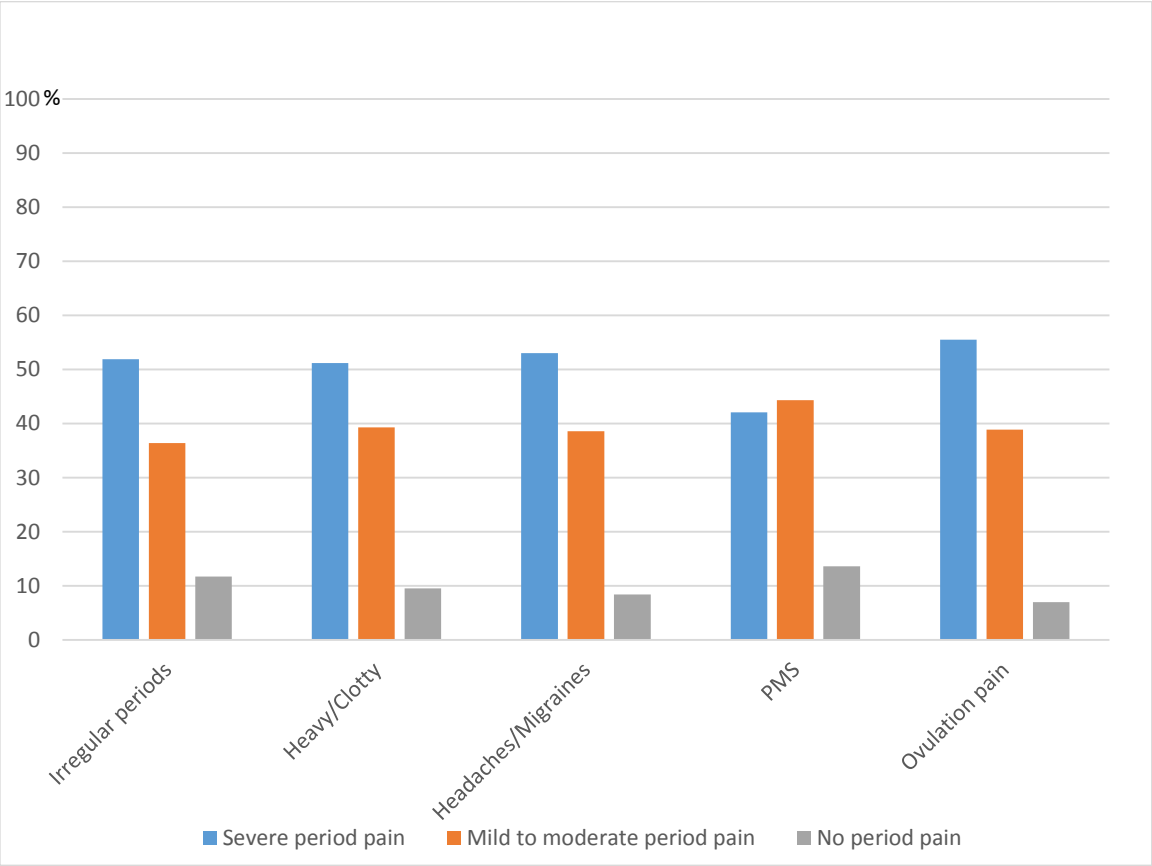


Table A.6. Dichotomous data for dysmenorrhoea and associated menstrual factors

Menstrual factor	Odds ratio	95% CI	P-value
Irregular periods	2.3	1.4:3.9	0.001
Heavy/clotty	5.7	3.4:9.4	<0.001
Headaches/migraines	3.8	2.2:6.6	<0.001
PMS	7.2	3.8:13.7	<0.001
Ovulation pain	7.6	4.1:14.1	<0.001
Gynaecological condition	3.2	1.8:5.8	<0.001

Table A.7. Dichotomous data associations between heavy/clotty periods and other factors

Symptom	Odds ratio	95% CI	P-value
Irregular periods	2.5	1.7:3.8	<0.001
Headaches/migraines	3.7	2.4:5.7	<0.001
Anxiety/depression	2.8	1.8:4.4	<0.001
PMS	7.3	3.7:14.1	<0.001
Ovulation pain	2.5	1.6:3.7	<0.001
Gynaecological condition	4.4	2.7:7.2	<0.001

Table A.8. Dichotomous associations between dysmenorrhoea and pregnancy issues

Pregnancy issue	Odds ration	95% CI	P-value
Infertility	1.9	1.03:3.6	0.04
IVF	1.8	0.5:2.8	0.71
Termination/miscarriage	2.25	1.3:4.0	0.07
Breech	0.6	0.3:1.3	0.18
Gestational HBP*	1.09	0.5:2.5	0.84
Gestational diabetes	3.2	0.7:13.9	0.12

*High blood pressure

Graph A.4. Period pain and obstetric GI symptoms

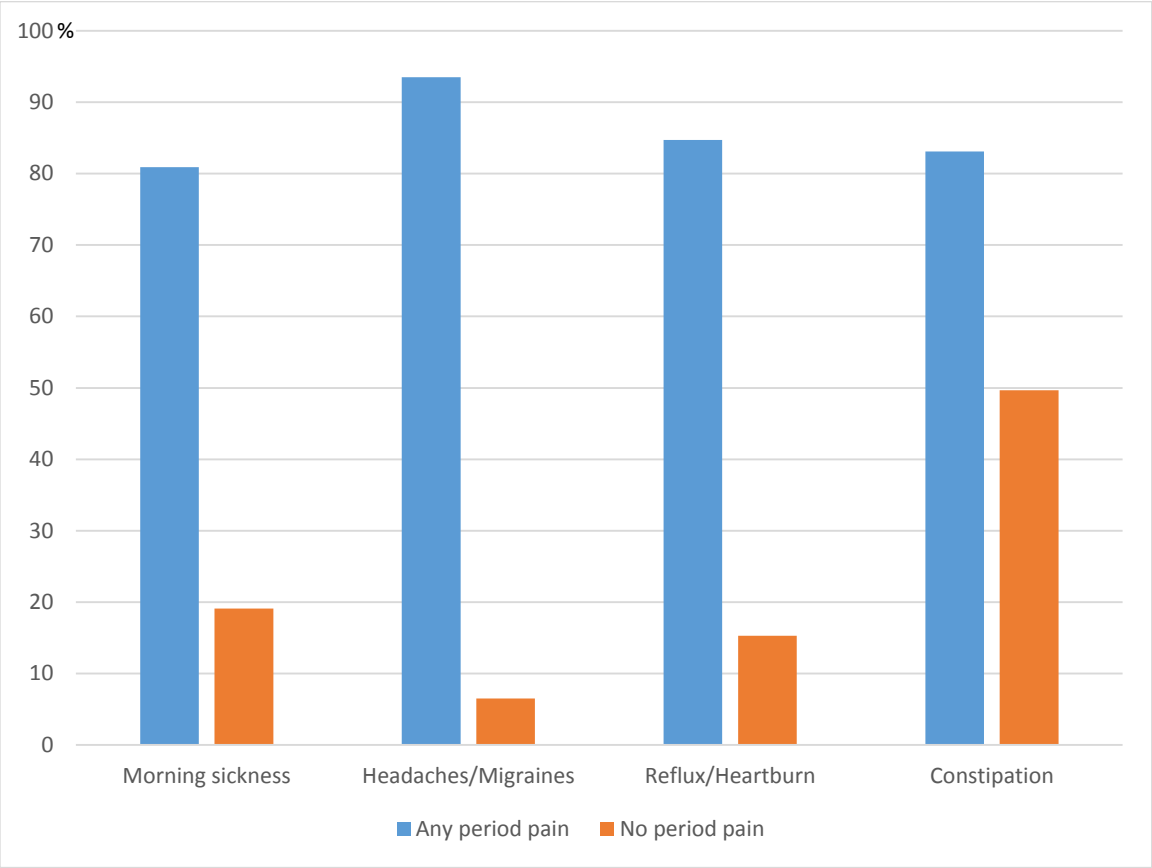


Table A.9. Constipation and associated variables

Symptom	Odds Ratio	95% CI	P-value
Dysmenorrhoea	2.3	1.4:3.7	0.002
Heavy/clotty menses	2.2	1.4:3.3	<0.001
Irregular periods	2.0	1.3:2.8	<0.001
Ovulation pain	1.7	1.2:2.4	0.007
Menstrual headaches	2.1	1.5:3.1	<0.001
PMS	2.3	1.2:4.3	0.012
Gynaecological condition	2.5	1.7:3.7	<0.001
Anxiety/depression	2.2	1.4:3.5	0.001
Gestational constipation	4.7	3.0:7.6	<0.001

Table A.10. Reflux or heartburn and associated variables

Symptom	Odds Ratio	95% CI	P-value
Heavy/clotty menses	2.5	1.5:3.9	<0.001
Irregular periods	2.0	1.4:3.0	<0.001
Ovulation pain	2.0	1.3:3.0	0.001
Menstrual headaches	2.7	1.8:4.0	<0.001
Gynaecological condition	2.4	1.7:3.6	<0.001
Anxiety/depression	2.5	1.5:4.2	0.001
Gestational constipation	2.1	1.3:3.4	0.002
Gestational reflux	3.6	2.1:6.0	<0.001
Gestational headaches	2.5	1.5:4.0	<0.001
Morning sickness	2.0	1.1:3.6	0.017
Gestational HBP*	2.3	1.2:4.5	0.012

*High blood pressure

Table A.11. Nausea or vomiting and associated variables

Symptom	Odds Ratio	95% CI	P-value
Dysmenorrhoea	4.2	2.1:8.3	<0.001
Irregular periods	2.7	1.8:4.1	<0.001
Heavy/clotty menses	3.3	1.9:5.5	<0.001
Ovulation pain	3.2	2.1:4.8	<0.001
Menstrual headaches	3.1	2.1:4.7	<0.001
PMS	3.0	1.3:6.9	0.009
Gynaecological condition	2.6	1.7:3.8	<0.001
Anxiety/depression	2.5	1.5:4.3	0.001
Morning sickness	2.5	1.3:4.8	0.005
Gestational headaches	2.7	1.6:4.6	<0.001
Gestational reflux	2.4	1.4:4.1	0.002
Gestational HBP*	0.3	0.1:0.9	0.023

*High blood pressure

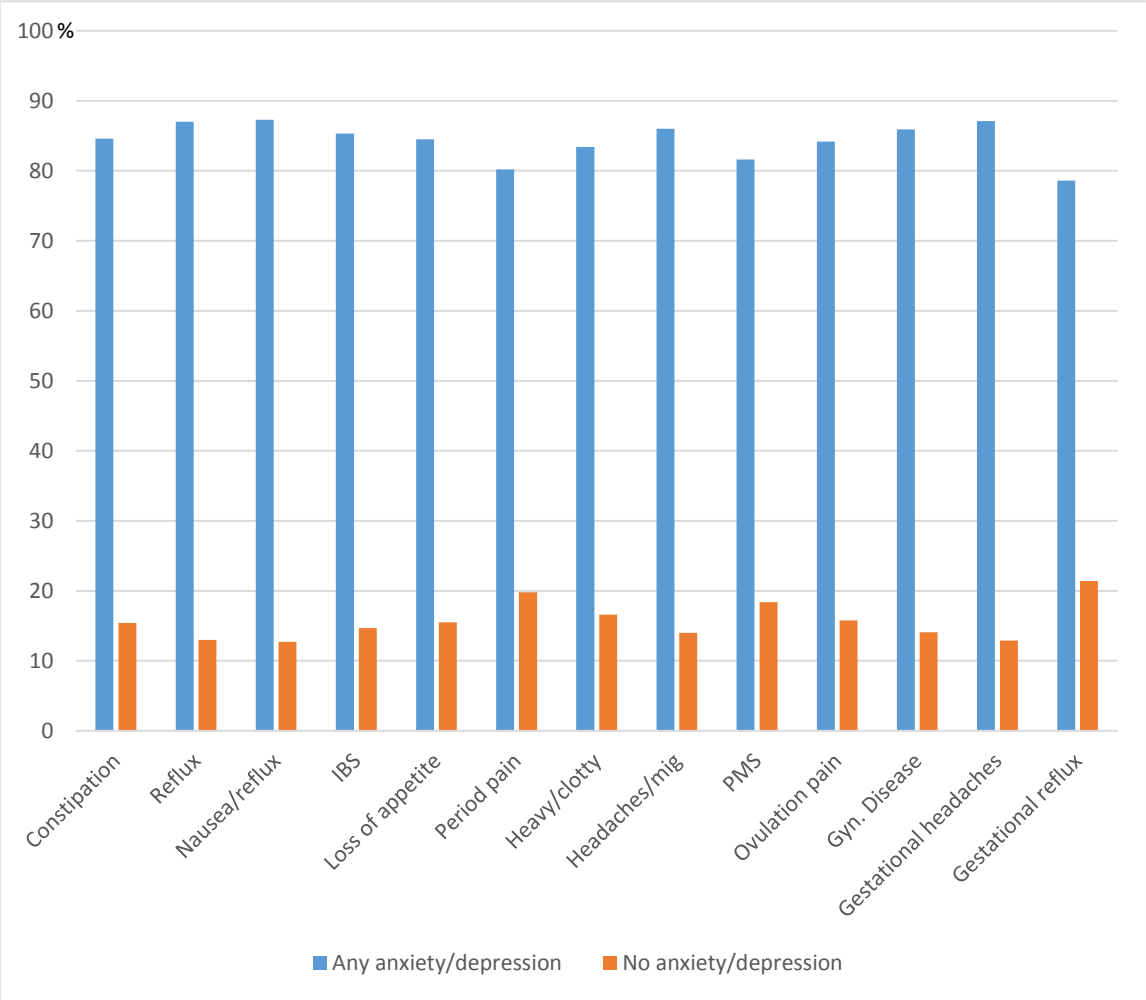
Table A.12. IBS and associated variables

Symptom	Odds Ratio	95% CI	P-value
Irregular periods	2.2	1.5:3.2	<0.001
Heavy/clotty menses	2.6	1.7:3.9	<0.001
Menstrual headaches	1.8	1.2:2.6	0.003
Ovulation pain	2.0	1.3:2.8	0.001
Gynaecological condition	2.9	2.0:4.2	<0.001
Anxiety/depression	2.4	1.5:3.7	<0.001
Gestational constipation	1.8	1.2:2.8	0.008
Gestational headaches	2.04	1.3:3.3	0.004
Gestational reflux	2.1	1.3:3.3	0.002

Table A.13. Loss of appetite and associated variables

Symptom	Odds Ratio	95% CI	P-value
Dysmenorrhoea	1.9	1.0:3.5	0.038
Irregular menses	1.7	1.1:2.6	0.012
Heavy/clotty menses	1.8	1.1:2.9	0.017
Menstrual headaches	2.3	1.5:3.4	<0.001
Ovulation pain	2.4	1.6:3.7	<0.001
PMS	3.6	1.4:9.3	0.008
OCP	0.5	0.4:0.8	0.006
Gynaecological condition	2.1	1.4:3.1	0.001
Anxiety/depression	1.8	1.0:3.0	0.033
Gestational headaches	2.5	1.5:4.3	0.001

Graph A.5. Mental health and GI/GY outcomes



*All results statistically significant at p=<0.001 except reflux, nausea/vomit (p=0.001), loss of appetite (p=0.03), dysmenorrhoea (p=0.008), gynaecological condition (p=0.001) gestation headaches (p=0.001) and gestational reflux (p=0.03).

Table A.14. Anxiety/depression and associated variable

Symptom	Odds Ratio	95% CI	P-value
Constipation	2.3	1.4:3.5	0.001
Reflux/heartburn	2.5	1.5:4.2	0.001
Nausea/vomit	2.5	1.5:4.3	0.001
Loss of appetite	1.8	1.0:3.0	0.033
IBS	2.4	1.5:3.8	<0.001
Dysmenorrhoea	2.0	1.2:3.4	0.009
Heavy/clotty menses	2.8	1.8:4.4	<0.001
Ovulation pain	2.2	1.4:3.5	<0.001
Menstrual headaches	2.6	1.6:4.1	<0.001
PMS	5.5	2.9:10.3	<0.001
Gynaecological condition	2.3	1.4:3.8	0.001
History of pregnancy	0.5	0.3:0.8	0.006
Gestational reflux	1.7	1.0:2.9	0.034
Gestational headaches	3.0	1.5:5.8	0.001

Appendix B: WSU women's health study results.

Descriptive statistics:

Table B.1a. Demographics

General Health	
• Excellent	• 110 (5.4%)
• Very good	• 549 (27%)
• Good	• 716 (35.2%)
• Fair	• 442 (21.7%)
• Poor	• 176 (8.6%)
• Missing	• 42 (2.1%)
Health issues interfering with normal social activities:	
• Extremely	• 221 (10.9%)
• Quite a bit	• 507 (24.9%)
• Moderately	• 572 (28.1%)
• Slightly	• 468 (23%)
• Not at all	• 225 (11.1%)
• Missing	• 42 (2.1%)
Feelings of anxiety or depression in the past year?	
• Severe	• 404 (19.9%)
• Moderate	• 703 (35.3%)
• Mild	• 683 (33.6%)
• None	• 203 (10%)
• Missing	• 42 (2.1%)

Table B.2. Gastrointestinal symptom severity and frequency

Constipation severity		Constipation frequency	
• Severe	• 287 (14.1%)	• Daily	• 77(4.9%)
• Moderate	• 515 (25.3%)	• Weekly	• 323 (20.4%)
• Mild	• 728 (35.8%)	• Monthly	• 343 (21.6%)
• None	• 448 (22%)	• Unpredictable	• 783 (49.3%)
• Missing	• 57 (2.8%)	• Missing	• 61 (3.8%)
Diarrhoea severity		Diarrhoea frequency	
• Severe	• 282 (13.9%)	• Daily	• 63 (3.7%)
• Moderate	• 522 (25.7%)	• Weekly	• 286 (16.8%)
• Mild	• 835 (41%)	• Monthly	• 386 (22.6%)
• None	• 328 (16.1%)	• Unpredictable	• 904 (53%)
• Missing	• 68 (3.3%)	• Missing	• 68 (3.7%)

Bloating severity • Severe • Moderate • Mild • None • Missing	 • 630 (31%) • 611 (30%) • 506 (24.9%) • 212 (10.4%) • 76 (3.7%)	Bloating frequency • Daily • Weekly • Monthly • Unpredictable • Missing	 • 354 (19.4%) • 435 (23.9%) • 507 (27.8%) • 450 (24.7%) • 77 (4.2%)
Abdominal pain severity • Severe • Moderate • Mild • None • Missing	 • 700 (34.4%) • 472 (23.2%) • 491 (24.1%) • 288 (14.2%) • 84 (4.1%)	Abdominal pain frequency • Daily • Weekly • Monthly • Unpredictable • Missing	 • 369 (21.1%) • 304 (17.4%) • 455 (26%) • 535 (30.6%) • 84 (4.8%)
IBS severity • Severe • Moderate • Mild • None • Missing	 • 201 (9.9%) • 323 (15.9%) • 296 (14.5%) • 1118 (54.9%) • 97 (4.8%)	IBS frequency • Daily • Weekly • Monthly • Unpredictable • Missing	 • 179 (19.5%) • 216 (23.6%) • 131 (14.3%) • 295 (32.2%) • 96 (10.5%)
Nausea/vomit severity • Severe • Moderate • Mild • None • Missing	 • 228 (11.2%) • 438 (21.5%) • 825 (40.5%) • 440 (21.6%) • 104 (5.1%)	Nausea/vomit frequency • Daily • Weekly • Monthly • Unpredictable • Missing	 • 79 (5%) • 217 (13.6%) • 307 (19.2%) • 886 (55.5%) • 106 (6.6%)
Reflux/H/burn severity • Severe • Moderate • Mild • None • Missing	 • 172 (8.5%) • 263 (32%) • 652 (12.9%) • 834 (41%) • 114 (5.6%)	Reflux/H/burn frequency • Daily • Weekly • Monthly • Unpredictable • Missing	 • 129 (11.9%) • 162 (14.9%) • 194 (17.8%) • 602 (55.3%) • 114 (10.5%)
Diet • Omnivore • Vegetarian • Allergy • Vegan • Carnivore • Paleo • Pescatarian • Missing	 • 1672 (82.2%) • 119 (5.8%) • 47 (2.3%) • 27 (1.3%) • 24 (1.2%) • 9 (0.4%) • 9 (0.4%) • 128 (6.3%)		
Do your GI symptoms change at different times of your menstrual cycle? • Yes	 • 1176(57.8%)	Do you take GI meds? • Yes • No	 • 672 (33%) • 1135 (55.8%)

• No • Unsure • No menses • Missing	• 160 (7.9%) • 364 (17.9%) • 207 (10.2%) • 128 (6.3%)	• Missing GI surgery? • Yes • No • Missing	• 228 (11.2%) • 377 (18.5%) • 1418 (69.7%) • 240 (11.8%)
Cyclical constipation • During menses • Midcyle • Premenstrual • Whole cycle • Unpredictable • Not cyclical • N/A	• 253 • 184 • 302 • 132 • 311 • 265 • 243	Cyclical diarrhoea • During menses • Midcyle • Premenstrual • Whole cycle • Unpredictable • Not cyclical • N/A	• 645 • 125 • 275 • 118 • 274 • 185 • 180
Cyclical abdominal pain • During menses • Midcyle • Premenstrual • Whole cycle • Unpredictable • Not cyclical • N/A	• 721 • 396 • 596 • 425 • 192 • 95 • 52	Cyclical IBS • During menses • Midcyle • Premenstrual • Whole cycle • Unpredictable • Not cyclical • N/A	• 313 • 145 • 192 • 208 • 307 • 174 • 471
Cyclical nausea/vomit • During menses • Midcyle • Premenstrual • Whole cycle • Unpredictable • Not cyclical • N/A	• 313 • 161 • 221 • 158 • 327 • 271 • 322	Cyclical reflux/heartburn • During menses • Midcyle • Premenstrual • Whole cycle • Unpredictable • Not cyclical • N/A	• 83 • 85 • 80 • 123 • 291 • 364 • 563

Table B.3: Digestive symptoms during menses

• Constipation • Diarrhoea • Abdominal pain • IBS • Nausea/vomit • Reflux/heartburn	• 253 (10.9%) • 645 (27.7%) • 721 (31%) • 313 (13.4%) • 313 (13.4%) • 83 (3.6%)

Table B.4. Digestive symptoms at midcycle

• Constipation	• 184 (16.8%)
• Diarrhoea	• 125 (11.4%)
• Abdominal pain	• 396 (36.1%)
• IBS	• 145 (13.2%)
• Nausea/vomit	• 161 (14.7%)
• Reflux/heartburn	• 85 (7.8%)

Table B.5. Digestive symptoms premenstrually

• Constipation	• 302 (18.1%)
• Diarrhoea	• 275 (16.5%)
• Abdominal pain	• 596 (35.8%)
• IBS	• 192 (11.5%)
• Nausea/vomit	• 221 (13.3%)
• Reflux/heartburn	• 80 (4.8%)

Table B.6. Digestive symptoms throughout the whole cycle

• Constipation	• 132 (11.3%)
• Diarrhoea	• 118 (10.1%)
• Abdominal pain	• 425 (36.5%)
• IBS	• 208 (17.9%)
• Nausea/vomit	• 158 (13.6%)
• Reflux/heartburn	• 123 (10.6%)

Table B.7. Age of menarche

8 years old or younger	6 (0.3%)
9 years old	25 (1.2%)
10 years old	67 (3.3%)
11 years old	305 (15%)
12 years old	471 (23.1%)
13 years old	408 (20%)
14 years old	246 (12.1%)
15 years old	113 (5.6%)
16 years old	40 (2%)
17 years old	11 (0.5%)
18 years old or later	4 (0.2%)
I've never had a period	1 (0.1%)
I can't remember	19 (0.9%)
Missing	319 (15.7%)
Total	2035 (100%)

Table B.8. Current status of menstruation

Do you still get a period?	
Yes	1436 (70.6%)
No	276 (13.6%)
Missing	323 (15.9%)
Total	2035 (100%)

Table B.9. Reasons for no menses

OCP or other drugs	131 (47.5%)
Hysterectomy, hysteroscopy or ablation	104 (37.7%)
Pregnancy/birth/breastfeeding	21 (7.6%)
Menopause	8 (2.9%)
Post pill amenorrhoea	4 (1.5%)
PCOS	3 (1.1%)
Opioid addiction	1 (0.4%)
Underweight	1 (0.4%)
Missing	3 (1.1%)
Total	276 (100%)

Table B.10: Drugs listed as OCP or other drugs

The oral contraceptive pill, Minerva, Mirena, Visanne, Aygestin, Femara, Lupron, Decapeptyl, Cerazette, Esmya, Implanon, Zoladex, Depo-Provera, Provera, Nexplanon, Cyproterone acetate (CPA), and IUD.

Table B.11: History of dysmenorrhoea, pain in the previous year, and frequency of pain

History of period pain	
Severe	839 (52.4%)
Moderate	341 (21.3%)
Mild	320 (20%)
None	102 (6.3%)
Total	1602 (100%)
Period pain in the past year	
Severe	673 (44.9%)
Moderate	373 (24.9%)
Mild	307 (20.5%)
None	146 (9.7%)
Total	1499 (100%)
Frequency of period pain	
None	28 (2.1%)
1 out of 6	90 (6.8%)
2 out of 6	124 (9.3%)
3 out of 6	141 (10.6%)
4 out of 6	140 (10.5%)
5 out of 6	139 (10.4%)
6 out of 6	670 (50.3%)
Total	1332 (100%)

Table B.12: Sites of dysmenorrhoea

Lower or upper abdomen	1309 (87.3%)
Lower back	958 (63.9%)
Down into legs or hips	596 (39.8%)
Anus/vagina/bowel/bladder	43 (2.9%)
Upper body/ribs	38 (2.5%)
Pubic bone/pelvis/groin	28 (1.9%)
Whole body/multiple sites	20 (1.3%)

Table B.13: History of irregular periods, and irregular periods in the previous year

Do you have a history of irregular periods?	
Yes	808 (51.4%)
No	764 (48.6%)
Total	1572 (100%)
Have you experienced irregular periods in the past year?	
Yes, comes at various times	458 (56.8%)
Yes, comes early	66 (8.2%)
Yes, comes late	122 (15.1%)
No	161 (19.9%)
Total	807 (100%)

Table B.14: Heaviness and frequency of heavy menses

How would you describe your periods?	
Very light	54 (3.5%)
Light	158 (10.3%)
Moderate	594 (38.6%)
Heavy	396 (25.8%)
Very Heavy	251 (16.3%)
Varied	84 (5.5%)
Total	1537 (100%)
Out of the last six, how many were heavy?	
1 out of 6	16 (2.2%)
2 out of 6	23 (3.15%)
3 out of 6	53 (7.3%)
4 out of 6	100 (13.7%)
5 out of 6	141 (19.4%)
6 out of 6	355 (48.8%)
Total	728 (100%)

Table B.15: Clotty periods and frequency

In the past year, have you experienced clotty periods?	
None	282 (18.4%)
Mildly	419 (27.3%)
Moderately	488 (31.9%)
Severely	312 (20.4%)
Prefer not to answer	31 (2%)
Total	1532 (100%)
Out of the last six, how many were clotty?	
1 out of 6	95 (7.8%)
2 out of 6	134 (11%)
3 out of 6	149 (12.3%)
4 out of 6	145 (11.9%)
5 out of 6	128 (10.5%)
6 out of 6	543 (44.7%)
Total	1214 (100%)

Table B.16. Ovulation pain and frequency

In the past year, have you experienced ovulation pain?	
None	484 (31.8%)
Mildly	358 (23.6%)
Moderately	346 (22.8%)
Severely	332 (21.8%)
Total	1520 (100%)
Out of the last six, how many did you experience ovulation pain?	
1 out of 6	79 (7.6%)
2 out of 6	111 (10.7%)
3 out of 6	149 (14.4%)
4 out of 6	151 (14.6%)
5 out of 6	87 (8.4%)
6 out of 6	440 (42.6%)
Total	1034 (100%)

Table B.17: Menstrual related headaches and frequency

In the past year, have you experienced menstrual headaches?	
None	582 (38.4%)
Mildly	364 (24%)
Moderately	339 (22.4%)
Severely	229 (15.1%)
Total	1514 (100%)
Out of the last six, how many did you experience menstrual headaches?	
1 out of 6	57 (5.2%)
2 out of 6	160 (14.5%)
3 out of 6	169 (15.3%)
4 out of 6	144 (13%)
5 out of 6	95 (8.6%)
6 out of 6	302 (27.4%)
Total	1103 (100%)

Table B.18: Menstrual migraines and frequency

In the past year, have you experienced menstrual migraines?	
None	985 (65.3%)
Mildly	213 (14.1%)
Moderately	158 (10.5%)
Severely	153 (10.1%)
Total	1509 (100%)
Out of the last six, how many did you experience menstrual migraines?	
1 out of 6	101 (19.3%)
2 out of 6	114 (21.8%)
3 out of 6	79 (15.1%)
4 out of 6	72 (13.8%)
5 out of 6	48 (9.2%)
6 out of 6	97 (18.5%)
Total	523 (100%)

Table B.19: PMS and frequency

In the past year, have you experienced PMS?	
None	109 (7.2%)
Mildly	328 (21.8%)
Moderately	510 (33.9%)
Severely*	559 (37.1%)
Total	1506 (100%)
Out of the last six, how many did you experience PMS?	
1 out of 6	40 (2.9%)
2 out of 6	80 (5.7%)
3 out of 6	105 (7.5%)
4 out of 6	137 (9.8%)
5 out of 6	147 (10.5%)
6 out of 6	862 (61.8%)
Total	1395 (100%)

*This result is higher than the average 20% expected (see Ju et al., 2014).

Table B.20: Specific PMS symptoms

What do you experience premenstrually?	
Headaches	
None	427 (31.4%)
Mildly	400 (29.4%)
Moderately	370 (27.2%)
Severely	165 (12.1%)
Total	1362 (100%)
Migraines	
None	861 (63.2%)
Mildly	207 (15.2%)
Moderately	169 (12.4%)
Severely	125 (9.2%)
Total	1362 (100%)
Sore breasts/nipples	
None	273 (20%)
Mildly	473(34.7%)
Moderately	397 (29.1%)
Severely	219 (16.1%)
Total	1362 (100%)
Mood changes	
None	61 (4.5%)
Mildly	318 (23.3%)
Moderately	512 (37.6%)
Severely	471 (34.6%)
Total	1362 (100%)

Bloating	
None	98 (7.2%)
Mildly	306 (22.5%)
Moderately	472 (34.7%)
Severely	486 (35.7%)
Total	1362 (100%)
Bowel changes	
None	182 (13.4%)
Mildly	313 (23%)
Moderately	477 (35%)
Severely	390 (28.6%)
Total	1362 (100%)
Acne/breakouts	
None	356 (26.1%)
Mildly	451 (33.1%)
Moderately	376 (27.6%)
Severely	179 (13.1%)
Total	1362 (100%)

Table B.21: Diagnosis of GY conditions

Have you been diagnosed with a gynaecological condition?	
Yes	988 (66.6%)
No	495 (33.4%)
Total	1483 (100%)
What diagnosis?	
Endometriosis/adenomyosis	724 (48.8%)
Ovarian cysts	525 (35.4%)
Abnormal pap results	278 (18.7%)
PCOS	262 (17.7%)
Fibroids/polyps	214 (14.4%)
Amenorrhoea	68 (4.6%)

Table B.22. GY surgery and specifics

Have you had gynaecological surgery?	
Yes	886 (60%)
No	591 (40%)
Total	1477 (100%)
Type of surgeries	
Laparoscopy/laparotomy	681 (46.1%)
Ablation/excision of endometriosis	553 (36.1%)
D&C	361 (24.4%)
Cervical cells removed	175 (11.8%)
Ovary/ies removed	54 (3.7%)
Tubal ligation	48 (3.2%)
Ovarian cyst	32 (2.2%)
Hysteroscopy	21 (1.4%)
Hysterectomy	15 (1%)
Tubal surgery	11 (0.7%)
ART related	10 (0.7%)
C-section	10 (0.7%)
Obstetric	8 (0.5%)
HYCOSE	6 (0.4%)
IUD removal	4 (0.3%)
Fibroids	4 (0.3%)
Other	3 (0.2%)

Table B.23: Infertility and specifics

Infertility*	
Yes	479 (25.9%)
No	1102 (74.1%)
Total	1581 (100%)
Were you given a diagnosis?**	
Not investigated	85 (17.7%)
Unexplained	159 (33.2%)
Male factors	82 (17.1%)
Female factors	360 (75.2%)
Both male and female factors	74 (15.4%)

*This question was asked 'Have you ever experienced problems with fertility (tried unsuccessfully to fall pregnant for more than 12 months)?' **Multiple answers could be chosen.

Table B.24: ART and specifics

Have you used ART?	
Yes	245 (15.5%)
No	1334 (84.5%)
Total	1579 (100%)
Are you currently using ART?	
Yes	52 (21%)
Which ART procedures?	
IVF	85 (34.7%)
Multiple approaches	69 (28.2%)
Fertility drugs	46 (18.8%)
IUI	16 (6.5%)
ICSI	15 (6.1%)

Table B.25: History, amount of pregnancies, outcomes, birth interventions or complications

Have you ever been pregnant?	
Yes	899 (57.4%)
No	666 (42.6%)
Total	1565 (100%)
How many times have you been pregnant?	
1	262
2	262
3	198
4	81
5 or more	101
Pregnancy outcomes	
1st term miscarriage	638
2nd term miscarriage	40
3rd term miscarriage	13
Live Birth	1186
Currently pregnant	55
Termination	105
Twins	16
Ectopic	19
Still birth	3
Other	88
Birth interventions/complications?	
Yes	474 (53.3%)
No	415 (46.7%)
Total	889 (100%)

Morning sickness?	
None*	140 (15.9%)
Mild	257 (29.1%)
Moderate	258 (29%)
Severe	230 (26%)
Total	883 (100%)
1st trimester	732 (98.5%)
2nd trimester	277 (37.3%)
3rd trimester	147 (19.8%)
Gestational constipation	
None*	359 (40.7%)
Mild	222 (25.1%)
Moderate	196 (22.2%)
Severe	106 (12%)
Total	883 (100%)
Gestational diarrhoea	
None*	614 (69.5%)
Mild	171 (19.4%)
Moderate	82 (9.3%)
Severe	16 (1.8%)
Total	883 (100%)
Gestational headaches	
None*	480 (54.4%)
Mild	197 (22.3%)
Moderate	149 (16.9%)
Severe	57 (6.5%)
Total	883 (100%)
Gestational migraines	
None*	698 (79%)
Mild	63 (7.1%)
Moderate	68 (7.7%)
Severe	54 (6.1%)
Total	883 (100%)
Gestational anxiety/depression	
None*	693 (78.5%)
Mild	191 (21.6%)
Moderate	92 (10.4%)
Severe	43 (4.9%)
Total	883 (100%)

Postnatal depression	
Yes	286 (39.4%)
No	391 (23.9%)
Unsure	48 (6.6%)
Total	725 (100%)
Breastfeeding	
Yes, easy	287 (39.5%)
Yes, difficult	386 (53.2%)
No	53 (7.3%)
Total	726 (100%)

*Gestational symptoms of 'none' were a combination of 'can't remember' and 'none' answers.

Table B.26. Birth interventions or complications

Birth interventions/complications?	
Yes	474 (53.1%)
No	255 (28.6%)
Haven't given birth yet	163 (18.3%)
Total	892 (100%)
Specifics*	
Epidural	263 (55.5%)
Artifical induction	220 (46.4%)
Emergency C-section	187 (39.5%)
Ventous/forceps	146 (30.8%)
Planned C-section	113 (23.8%)
Preeclampsia	29 (6.1%)
Anaemia/haemorrhage	29 (6.1%)
Episiotomy/tearing	26 (5.5%)
Preterm labour	21 (4.4%)
Breech	19 (4%)
Nuchal cord	15 (3.2%)
Posterior presentation	15 (3.2%)
Placenta Previa	8 (1.7%)
Shoulder dystocia	6 (1.3%)
Placenta abruption	5 (1.1%)

*Participants could choose multiple options and add their own if not listed.

Inferential statistics:

Table B.27: Dysmenorrhoea severity dichotomised with other associations

Symptom	Odds ratio	95% CI	P-value
GY			
Irregular menses*	10.2	5.8:18.2	<0.001
Heavy menses	6.1	3.2:11.5	<0.001
Heavy menses**	5.6	4.2:7.5	<0.001
Clotty menses	3.0	1.9:4.6	<0.001
Clotty menses**	3.9	3.0:5.1	<0.001
Ovulation pain	5.1	3.3:8.0	<0.001
Ovulation pain**	4.4	3.5:5.7	<0.001
Menstrual headaches	4.1	2.6:6.5	<0.001
Menstrual headaches**	3.3	2.6:4.1	<0.001
Menstrual migraines	4.8	2.5:9.3	<0.001
Menstrual migraines**	8.2	5.6:12.2	<0.001
PMS*	17.1	10.7:27.4	<0.001
PMS**	2.7	1.8:4.1	<0.001
PMS headaches**	2.7	2.1:3.5	<0.001
PMS migraine**	3.8	2.8:5.2	<0.001
PMS breast/nipple sensitivity**	2.5	1.9:3.3	<0.001
PMS mood changes	3.1	1.9:5.3	<0.001
PMS bloating	6.2	4:9.6.0	<0.001
PMS bowel changes	6.1	4.4:8.5	<0.001
PMS acne/breakouts	2.5	1.9:3.3	<0.001
Gynaecological surgery**	3.2	2.5:4.0	<0.001
Infertility	1.7	1.3:2.2	<0.001
GI∞			
Constipation (y/n)	2.0	1.3:3.0	0.001
Constipation**	3.5	2.7:4.6	<0.001
Diarrhoea	3.3	2.2:5.1	<0.001
Diarrhoea**	2.7	2:3.5.0	<0.001
Bloating	2.6	1.6:4.3	<0.001
Bloating**	4.9	3.5:6.8	<0.001
Abdominal pain	4.2	2.7:6.3	<0.001
Abdominal pain**	4.7	3.5:6.3	<0.001
IBS	3.3	2:5.5.0	<0.001
IBS**	2.3	1.8:2.9	<0.001
Nausea/vomit	3.2	2.2:4.9	<0.001
Nausea/vomit**	3.3	2.6:4.2	<0.001
Reflux/heartburn	2.2	1.4:3.3	<0.001
Reflux/heartburn**	1.8	1.4:2.3	<0.001
Cyclical GI changes**	5.6	3.9:8.0	<0.001
Mental health			
Emotions	OR (in last 12 months)	95% CI (in last 12 months)	P-value
Happiness**	0.4	0.3:0.6	<0.001

Anger/frustration	4.6	2.0:10.5	<0.001
	(1.7)	(0.6:5.0)	(0.33)
Anger/frustration (always or less)**	2.9	1.6:5.4	<0.001
Anger/frustration (y/n)**	2.1	1.1:4.1	0.03
Anger/frustration**	2.2	1.8:2.9	<0.001
Depression (y/n)	2.9	1.9:4.4	<0.001
	(2.3)	(1.6:3.4)	(<0.001)
Depression (y/n)**	2.5	1.9:3.2	<0.001
Depression**	4.0	2.8:5.7	<0.001
Anxiety/fear/worry (y/n)	2.0	0.9:4.4	0.11
	(2.3)	(1.1:4.7)	(0.02)
Anxiety/fear/worry**	2.9	2.1:3.6	<0.001
Grief/sorrow (y/n)	2.4	1.6:3.6	<0.001
	(2.2)	(1.5:3.1)	(<0.001)
Grief/sorrow (y/n)**	2.1	1.6:2.6	<0.001
Grief/sorrow**	2.6	1.8:3.7	<0.001
Sadness**	2.7	2.1:3.5	<0.001
Rumination (y/n)	3.4	1.9:6.0	<0.001
	(2.5)	(1.4:4.4)	(0.002)
Rumination (y/n)**	2.8	1.9:4.2	<0.001
Rumination**	2.6	2:3.3.0	<0.001
Postnatal depression	1.9	1.4:2.7	<0.001
	(1.5)	(1.1:2.1)	(0.03)
General anxiety/depression**	2.6	1.8:3.6	<0.001
Social life impacted by health (y/n)	6.4	3.2:12.7	<0.001
Social life impacted by health**	4.4	3.3:5.8	<0.001
Social life impacted by health***	5.7	4.5:7.2	<0.001
Obstetric			
Gestational headaches**	2.0	1.5:2.7	<0.001
Gestational migraines**	2.8	1.8:4.4	<0.001
Gestational anxiety/depression**	1.7	1.2:2.3	0.001
Birth complications/interventions**	1.5	1.1:2.0	0.009

∞results adjusted for the use of dysmenorrhoea medication.
*as measured from dysmenorrhoea from the previous twelve months (none vs any), and for dysmenorrhoea (none and mild vs moderate and severe) the OR is 3.6 (95% CI 2.5:5.2, p=<0.001).
**With dysmenorrhoea dichotomised as 'none and mild' compared to 'moderate and severe'.
***With dysmenorrhoea dichotomised as 'severe' compared to 'less than severe'.

Table B.27a: GI surgery and associated GY variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (severe vs less)	3.0	2.3:4.0	<0.001
Irregular menses	1.5	1.2:1.9	0.002
Gynaecological condition	3.2	2.3:4.5	<0.001

Table B.28: History of dysmenorrhoea and PMS symptom associations

PMS symptom	Odds ratio	95% CI	P-value
Headaches	2.8	1.7:4.6	<0.001
Migraines	4.2	2.1:8.6	<0.001
Breast/nipple sensitivity	1.7	1.02:2.9	0.041
Bloating	3.2	1.7:6.0	<0.001
Bowel changes	3.9	2.3:6.6	<0.001
Acne/breakouts	2.6	1.6:4.2	<0.001

Table B.29: Dysmenorrhoea in the past year and PMS symptom associations

PMS symptom	Odds ratio	95% CI	P-value
Headaches	2.5	1.6:4.1	<0.001
Migraines	3.0	1.6:5.5	<0.001
Breast/nipple sensitivity	2.1	1.3:3.5	0.004
Bloating	3.8	2:7.2.0	<0.001
Bowel changes	4.3	2.5:7.1	<0.001
Mood changes	2.5	1.1:5.7	0.032

Crosstab B.1: Dysmenorrhoea severity and constipation frequency

		Constipation frequency				
		Daily	Weekly	Monthly	Unpredictable	Total
Severe	Count	48	173	169	327	717
	% within	6.7%	24.1%	23.6%	45.6%	100.0%
Less than severe	Count	9	86	115	304	514
	% within	1.8%	16.7%	22.4%	59.1%	100.0%
Total	Count	57	259	284	631	1231
	% within	4.6%	21.0%	23.1%	51.3%	100.0%

*p=<0.001

Table B.29a: Other GY variables and their GI associations

Variable	Odds ratio	95% CI	P-value
Irregular menses*			
Constipation (y/n)	1.7	1.4:2.2	<0.001
Constipation**	1.7	1.4:2.1	<0.001
Diarrhoea	1.4	1.2:1.8	0.01
Bloating	1.4	1.0:2.0	0.03
Bloating (irr.menses last year)	0.5	0.3:0.8	0.006
Abdominal pain	2.0	1.5:2.7	<0.001
Abdominal pain (irr.menses last year)	0.6	0.3:0.9	0.02
IBS	1.4	1.1:1.7	0.002
Nausea/vomit	2.1	1.6:2.6	<0.001
Nausea/vomit (irr.menses last year)	0.6	0.4:1.0	0.04
Reflux/heartburn	1.7	1.4:2.1	<0.001
Heavy menses			
Constipation (y/n)	1.8	1.4:2.3	<0.001
Constipation**	1.7	1.4:2.1	<0.001
Diarrhoea	1.8	1.4:2.4	<0.001
Bloating	1.9	1.3:2.7	<0.001
Abdominal pain	2.6	1.9:3.6	<0.001
IBS	1.3	1.1:1.7	0.004
Nausea/vomit	2.7	1.6:2.7	<0.001
Reflux/heartburn	1.3	1.0:1.6.0	0.02
Clotty menses			
Constipation (y/n)	1.6	1.2:2.1	0.003
Constipation**	1.8	1.3:2.4	<0.001
Diarrhoea	2.0	1.4:2.7	<0.001
Bloating	3.3	2.3:4.6	<0.001
Abdominal pain	3.9	2.9:5.3	<0.001
IBS	1.7	1.3:2.3	<0.001
Nausea/vomit	2.3	1.7:3.0	<0.001
Reflux/heartburn	1.3	1.0:1.7	0.03
Ovulation pain			
Constipation (y/n)	2.2	1.7:2.8	<0.001
Constipation**	2.2	1.7:2.8	<0.001
Diarrhoea	2.0	1.5:2.7	<0.001
Bloating	5.1	3.6:7.3	<0.001
Abdominal pain	4.4	3.3:5.9	<0.001
IBS	2.0	1.6:2.5	<0.001
Nausea/vomit	2.8	2.2:3.6	<0.001
Reflux/heartburn	1.6	1.3:2.0	<0.001
Menstrual headaches			

Constipation (y/n)	1.7	1.3:2.1	<0.001
Constipation**	2.8	2.2:3.6	<0.001
Diarrhoea	2.0	1.5:2.7	<0.001
Bloating	3.5	2.5:4.9	<0.001
Abdominal pain	3.6	2.6:4.8	<0.001
IBS	1.8	1.5:2.3	<0.001
Nausea/vomit	2.6	2.0:3.3	<0.001
Reflux/heartburn	1.5	1.2:1.9	<0.001
Menstrual migraines			
Constipation (y/n)	2.2	1.7:3.0	<0.001
Constipation**	2.1	1.7:2.5	<0.001
Diarrhoea	2.0	1.5:2.8	<0.001
Bloating	3.1	2.0:4.8	<0.001
Abdominal pain	4.1	2.7:6.1	<0.001
IBS	2.1	1.7:2.6	<0.001
Nausea/vomit	3.3	2.5:4.5	<0.001
Reflux/heartburn	1.6	1.3:2.0	<0.001
PMS			
Constipation (y/n)	1.5	1.0:2.4	0.05
Diarrhoea	2.2	1.4:3.5	<0.001
Bloating	5.0	3.2:7.8	<0.001
Abdominal pain	3.6	2.4:5.5	<0.001
IBS	1.5	1.0:2.3	0.04
Nausea/vomit	1.8	1.2:2.7	0.007

*As measured from 'a history of irregular periods'. **None and mild vs moderate and severe.

Table B.29b: Constipation* and selected associated variables

Symptom	Odds ratio	95% CI	P-value
GY condition	2.4	1.9:3.0	<0.001
Reflux/heartburn	1.8	1.4:2.2	<0.001
Nausea/vomit	2.7	2.3:3.3	<0.001
Infertility**	1.4	1.1:1.9	0.008
Gestational anxiety/depression	1.5	1.1:2.1	0.02
Social life impacted by health	2.6	2.1:3.1	<0.001
Social life impacted by health**	2.2	1.7:2.8	<0.001

*Categorised as 'none' and 'mild' compared to 'moderate' and 'severe'.
**Constipation categorised as 'any' compared to 'none'.

Table B.30: Endometriosis/adenomyosis associations

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (severe vs less)	35.1	22.8:53.8	<0.001
Heavy menses	2.5	1.8:3.3	<0.001
Clotty menses	2.2	1.5:3.2	<0.001
Ovulation pain	5.8	4.2:8.1	<0.001
Menstrual headaches	3.0	2.2:4.0	<0.001
PMS	2.7	1.5:4.7	<0.001
PMS headaches	2.8	2.0:3.9	<0.001
PMS migraines	2.6	1.9:3.6	<0.001
PMS breast/nipple	2.5	1.7:3.6	<0.001
PMS bloating	5.8	3.0:11.0	<0.001
PMS bowel changes	5.3	3.2:8.6	<0.001
PMS acne	1.7	1.2:2.3	0.003
Constipation	3.6	2.6:5.0	<0.001
Diarrhoea	1.6	1.1:2.4	0.025
Bloating	7.0	4.0:12.2	<0.001
Abdominal pain	12.3	7.0:21.5	<0.001
IBS	2.0	1.5:2.6	<0.001
Nausea/vomit	3.0	2.1:4.2	<0.001
Reflux/heartburn	1.5	1.2:2.0	0.006
Depressed feeling	2.7	2.0:3.8	<0.001
Gestational headache	1.7	1.2:2.4	0.006
Gestational migraine	2.3	1.4:3.8	<0.001
Anxiety/depression	3.4	2.1:5.7	<0.001
Infertility	1.4	1.0:1.9	0.035
Digestive surgery	2.2	1.5:3.1	<0.001

Table B.30a: Endometriosis, other GY diagnoses and total sample frequency comparisons (to assess skewing of data towards those with endometriosis rather than the general female population)

Presence of variable	Endo (n=varied)	Other GY (n=varied)	Total (n=varied)
Demographics			
Home owner**	45% (n=323 of 724)	57% (n=149 of 263)	67% (n=1046 of 1567)
18-28 years**	31% (n=227 of 724)	17% (n=44 of 263)	25% (n=505 of 2035)
29-38 years	51% (n=368 of 724)	52% (n=137 of 263)	49% (n=1003 of 2035)
39-48 years	18% (n=129 of 724)	31% (n=82 of 263)	26% (n=527 of 2035)
Under/post graduate	57% (n=410 of 724)	61% (n=160 of 263)	58% (n=1174 of 2013)
Married/domestic partnership**	71% (n=500 of 706)	79% (n=205 of 259)	75% (n=1476 of 1973)
GY variables			
Dysmenorrhoea (severe vs less)**	84% (n=611 of 724)	23% (n=61 of 262)	52% (n=839 of 1602)
Dysmenorrhoea (y/n)**	98% (n=712 of 724)	91% (n=239 of 262)	94% (n=1500 of 1602)
Dysmenorrhoea (last year y/n)**	97% (n=687 of 712)	87% (n=208 of 239)	90% (n=1353 of 1499)
Dysmenorrhoea* **	95% (n=685 of 724)	59% (n=154 of 262)	74% (n=1180 of 1602)
Dysmenorrhoea medications**	90% (n=651 of 724)	58% (n=153 of 262)	71% (n=1117 of 1577)
Irregular menses**	60% (n=437 of 724)	56% (n=147 of 262)	51% (n=808 of 1572)
Irregular menses (last year)	82% (n=357 of 437)	82% (n=120 of 147)	80% (n=646 of 807)
Heavy menses**	55% (n=391 of 708)	34% (n=87 of 260)	42% (n=647 of 1537)
Clotty menses**	90% (n=623 of 695)	80% (n=203 of 255)	81% (n=1219 of 1501)
Ovulation pain**	88% (n=622 of 707)	56% (n=145 of 260)	68% (n=1036 of 1520)
Menstrual headache**	74% (n=526 of 707)	50% (n=129 of 260)	62% (n=932 of 1514)
Menstrual migraine**	48% (n=338 of 707)	24% (n=63 of 260)	35% (n=524 of 1506)
PMS**	96% (n=680 of 707)	90% (n=235 of 260)	93% (n=1397 of 1506)
GY diagnoses:			
PCOS	21% (n=154 of 730)	41% (n=109 of 264)	15% (n=262 of 1773)
Endometriosis/adenomyosis	100% (n=724 of 724)	0% (n=0 of 0)	41% (n=724 of 1772)
Amenorrhoea	5% (n=36 of 725)	11% (n=28 of 263)	3% (n=64 of 1971)
Fibroids/polyps	21% (n=151 of 728)	24% (n=63 of 263)	12% (n=214 of 1821)
*Ovarian cysts**	60% (n=434 of 727)	36% (n=95 of 263)	35% (n=525 of 1510)
Abnormal pap smear	24% (n=176 of 725)	37% (n=98 of 265)	15% (n=273 of 1762)
GY surgery	87% (n=633 of 724)	52% (n=138 of 263)	60% (n=886 of 1477)
Laparoscopy	98% (n=616 of 632)	33% (n=45 of 138)	77% (n=681 of 885)
Ablation/excision	86% (n=543 of 632)	5% (n=7 of 138)	60% (n=533 of 885)
Hysterectomy	2% (n=13 of 632)	<1% (n=1 of 138)	2% (n=15 of 885)
Ovary/ies removed	8% (n=49 of 632)	4% (n=6 of 138)	6% (n=54 of 885)
Abnormal cervical cells	17% (n=107 of 632)	41% (n=57 of 138)	20% (n=175 of 885)
Dilation and curettage	40% (n=250 of 632)	45% (n=62 of 138)	41% (n=361 of 885)
Tubal ligation	6% (n=36 of 632)	5% (n=7 of 131)	5% (n=48 of 885)
Infertility**	39% (n=284 of 723)	32% (n=84 of 263)	30% (n=479 of 1581)
ART	19% (n=140 of 723)	19% (n=51 of 262)	16% (n=245 of 1579)
Birth interventions/complications	66% (n=151 of 228)	65% (n=100 of 155)	53% (n=474 of 889)
Difficulty breastfeeding	61% (n=127 of 207)	58% (n=85 of 147)	29% (n=386 of 1309)
Postnatal depression	43% (n=97 of 227)	39% (n=61 of 157)	39% (n=286 of 726)
Anxiety/depression (y/n)**	96% (n=694 of 724)	87% (n=229 of 263)	89% (n=1790 of 1993)
Anxiety/depression* **	65% (n=470 of 724)	52% (n=136 of 263)	56% (n=1107 of 1993)
Social life impacted by health**	84% (n=605 of 724)	53% (n=140 of 263)	65% (n=1300 of 1993)
GI variables			
Constipation (y/n)**	87% (n=631 of 724)	65% (n=172 of 263)	77% (n=1530 of 1978)
Constipation* **	54% (n=388 of 724)	24% (n=62 of 263)	41% (n=802 of 1978)
Diarrhoea (y/n) **	90% (n=649 of 724)	84% (n=222 of 263)	83% (n=1639 of 1967)
Diarrhoea* **	54% (n=387 of 724)	31% (n=82 of 263)	41% (n=804 of 1967)
Bloating (y/n)**	97% (n=704 of 724)	84% (n=221 of 263)	89% (n=1747 of 1959)
Bloating* **	84% (n=605 of 724)	49% (n=130 of 263)	63% (n=1241 of 1959)
Abdominal pain (y/n)**	98% (n=707 of 724)	77% (n=203 of 263)	85% (n=1663 of 1951)
Abdominal pain* **	88% (n=637 of 724)	33% (n=87 of 263)	60% (n=1172 of 1951)
IBS (y/n)**	55% (n=397 of 724)	38% (n=100 of 263)	42% (n=820 of 1938)

IBS* **	39% (n=281 of 724)	22% (n=57 of 263)	27% (n=524 of 1938)
Nausea/vomit (y/n)**	88% (n=635 of 724)	71% (n=186 of 263)	77% (n=1491 of 1931)
Nausea/vomit* **	51% (n=371 of 724)	21% (n=55 of 263)	35% (n=666 of 1931)
Reflux/heartburn (y/n)**	63% (n=456 of 724)	53% (n=140 of 263)	57% (n=1087 of 1921)
Reflux/heartburn* **	26% (n=190 of 724)	17% (n=45 of 263)	23% (n=435 of 1921)
GI medications**	47% (n=343 of 724)	31% (n=81 of 263)	37% (n=672 of 1807)
GI surgery**	28% (n=206 of 724)	16% (n=41 of 263)	21% (n=377 of 1795)
Gestation variables			
Morning sickness	82% (n=261 of 320)	87% (n=160 of 184)	87% (n=745 of 885)
Gestational constipation	59% (n=190 of 320)	61% (n=112 of 184)	59% (n=524 of 883)
Gestational diarrhoea	31% (n=100 of 320)	29% (n=54 of 184)	30% (n=269 of 883)
Gestational headaches	53% (n=168 of 320)	40% (n=73 of 184)	46% (n=403 of 883)
Gestational migraines	27% (n=86 of 320)	14% (n=25 of 184)	21% (n=185 of 883)
Gestational anxiety/depression	43% (n=136 of 320)	36% (n=67 of 184)	37% (n=326 of 883)

*dichotomised as 'none and mild' compared to 'moderate and severe', these results are for 'moderate and severe' symptomatology.

**Statistically significant differences (odds ratios given for endometriosis and other GY diagnoses and endometriosis and the total sample):

Demographics:

Those *with* endometriosis were *less* likely to be homeowners (OR 0.6, 95% CI 0.5:0.8, p=<0.001 and OR 0.4, 95% CI 0.3:0.5, p=<0.001).

Those *with* endometriosis were *more* likely to be in the younger (18-28) age group (OR 2.3, 95% CI 1.6:3.3, p=<0.001 and OR 1.8, 95% CI 1.5:2.2, p=<0.001).

Those *with* endometriosis were *less* likely to be married or in a domestic partnership than those with other GY diagnoses (OR 0.6, 95% CI 0.5:0.9, p=0.01).

Those *with* endometriosis were *more* likely to experience anxiety/depression (OR 3.4, 95% CI 2.1:5.7, p=<0.001 and OR 2.6, 95% CI 1.8:3.9, p=<0.001), specifically an experience of moderate to severe anxiety/depression (OR 1.7, 95% CI 1.3:2.3, p=<0.001 and OR 1.5, 95% CI 1.2:1.8, p=<0.001).

Those *with* endometriosis were *more* likely to have their social life impacted by their health (OR 4.5, 95% CI 3.3:6.1, p=<0.001 and OR 2.7, 95% CI 2.2:3.4, p=<0.001).

GY variables:

Those *with* endometriosis were far *more* likely to suffer severe dysmenorrhoea (OR 17.8, 95% CI 12.6:25.3, p=<0.001 and OR 4.9, 95% CI 3.9:6.1, p=<0.001), more likely to have had any dysmenorrhoea (OR 5.7, 95% CI 2.8:11.7, p=<0.001 and OR 4.0, 95% CI 2.2:7.4, p=<0.001), and more likely to have had dysmenorrhoea in the previous year (OR 4.1, 95% CI 2.4:7.1, p=<0.001 and OR 3.0, 95% CI 1.9:4.6, p=<0.001).

Those *with* endometriosis were *more* likely to have moderate to severe dysmenorrhoea (OR 12.3, 95% CI 8.2:18.5, p=<0.001 and OR 6.3, 95% CI 4.5:8.8, p=<0.001).

Those *with* endometriosis were *more* likely to have taken period pain medications (OR 6.1, 95% CI 4.3:8.6, p=<0.001 and OR 3.5, 95% CI 2.7:4.6, p=<0.001).

Those *with* endometriosis were *more* likely to have a history of irregular menses than the total sample (OR 1.4, 95% CI 1.2:1.7, p=<0.001).

Those *with* endometriosis were *more* likely to have heavy periods (OR 2.5, 95% CI 1.8:3.3, p=<0.001 and OR 1.7, 95% CI 1.4:2.0, p=<0.001).

Those *with* endometriosis were *more* likely to have clotty periods (OR 2.2, 95% CI 1.5:3.3, p=<0.001 and OR 2.0, 95% CI 1.5:2.6, p=<0.001).

Those *with* endometriosis were *more* likely to experience ovulation pain (OR 5.8, 95% CI 4.2:8.1, p=<0.001 and OR 3.4, 95% CI 2.7:4.4, p=<0.001).

Those *with* endometriosis were *more* likely to have menstrual related headaches (OR 3.0, 95% CI 2.2:4.0, p=<0.001 and OR 1.8, 95% CI 1.5:2.2, p=<0.001).

Those *with* endometriosis were *more* likely to have menstrual related migraines (OR 2.9, 95% CI 2.1:3.9, p=<0.001 and OR 1.7, 95% CI 1.4:2.1m p=<0.001).

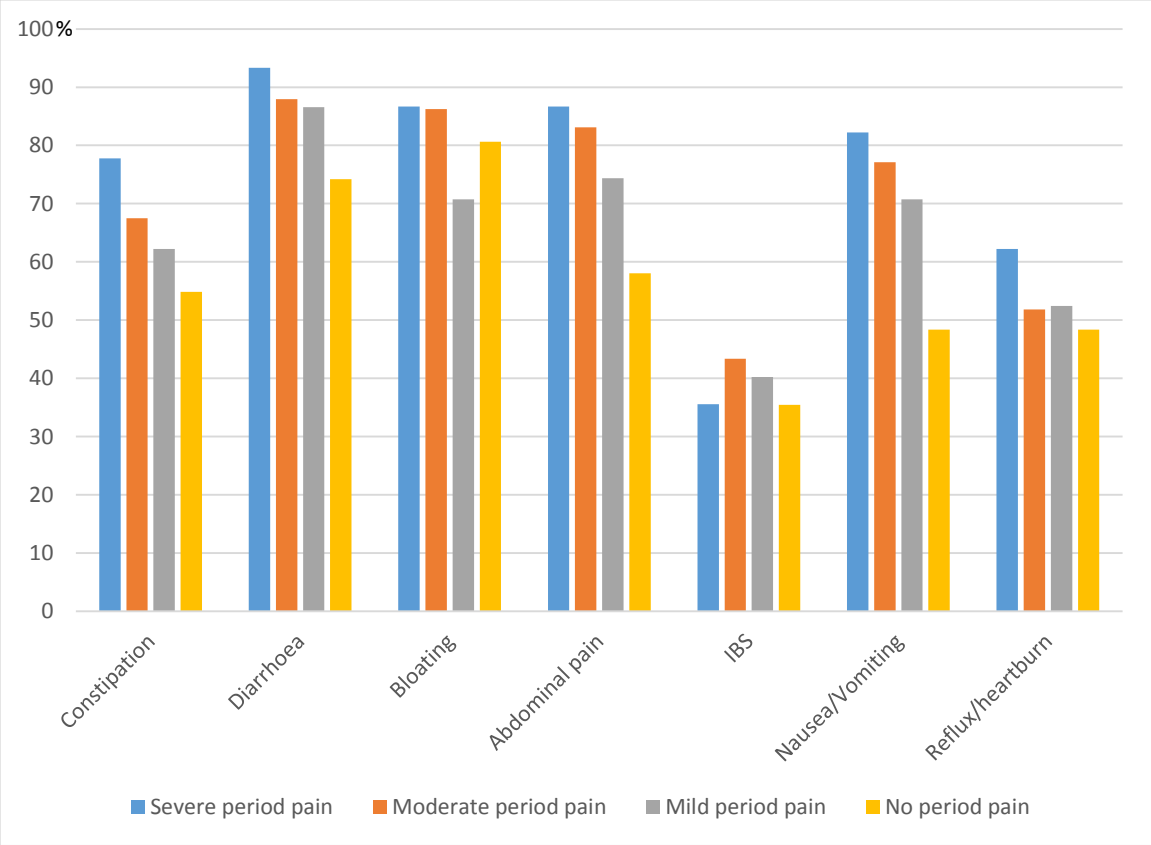
Those *with* endometriosis were *more* likely to have PMS (OR 2.7, 95% CI 1.5:4.7, p=<0.001 and OR 2.0, 95% CI 1.3:3.0, p=0.002).

Those *with* endometriosis were *more* likely to have been diagnosed with an ovarian cyst (OR 2.1, 95% CI 1.6:2.8, p=<0.001 and OR 2.3, 95% CI 1.9:2.7, p=<0.001).

Those *with* endometriosis were *more* likely to experience infertility (OR 1.4, 95% CI 1.0:1.9, p=0.04 and OR 1.5, 95% CI 1.2:1.8, p=<0.001).

GI variables:
Those *with* endometriosis were *more* likely to have constipation (OR 3.6, 95% CI 2.6:5.0, p=<0.001 and OR 2.0, 95% CI 1.6:2.5, p=<0.001), specifically moderate to severe constipation (OR 37, 95% CI 2.7:5.2, p=<0.001).
Those *with* endometriosis were *more* likely to have diarrhoea (OR 1.6, 95% CI 1.1:2.4, p=0.03 and OR 1.7, 95% CI 1.3:2.3, p=<0.001), specifically moderate to severe diarrhoea (OR 2.5, 95% CI 1.9:3.4, p=<0.001 and OR 1.7, 95% CI 1.4:2.0, p=<0.001).
Those *with* endometriosis were *more* likely to have bloating (OR 6.7, 95% CI 3.8:11.6, p=<0.001 and OR 4.3, 95% CI 2.3:6.8, p=<0.001), specifically moderate to severe bloating (OR 5.2, 95% CI 3.8:7.1, p=<0.001).
Those *with* endometriosis were *more* likely to have abdominal pain (OR 12.3, 95% CI 7:12.5, p=<0.001 and OR 7.2, 95% CI 4.4:11.8, p=<0.001), specifically moderate to severe abdominal pain (OR 14.8, 95% CI 10.5:20.8, p=<0.001 and OR 4.9, 95% CI 3.8:6.2, p=<0.001).
Those *with* endometriosis were *more* likely to have IBS (OR 2.0, 95% CI 1.5:2.6, p=<0.001 and OR 1.7, 95% CI 1.4:2.0, p=<0.001), specifically moderate to severe IBS (OR 2.3, 95% CI 1.6:3.2, p=<0.001 and OR 1.7, 95% CI 1.4:2.0, p=<0.001).
Those *with* endometriosis were *more* likely to have nausea/vomiting (OR 3.0, 95% CI 2.1:4.2, p=<0.001 and OR 2.1, 95% CI 1.6:2.7, p=<0.001), specifically moderate to severe nausea/vomiting (OR 4.0, 95% CI 2.9:5.5, p=<0.001).
Those *with* endometriosis were *more* likely to have reflux/heartburn (OR 1.5, 95% CI 1.1:2.0, p=0.006 and OR 1.3, 95% CI 1.1:1.6, p=0.003), specifically more moderate to severe reflux/heartburn than those with other GY diagnoses (OR 1.7, 95% CI 1.2:2.5, p=0.003)
Those *with* endometriosis were *more* likely to take GI medications (OR 2.0, 95% CI 1.5:2.7, p=<0.001 and OR 1.5, 95% CI 1.3:1.8, p=<0.001).
Those *with* endometriosis were *more* likely to have GI surgery (OR 2.2, 95% CI 1.5:3.1, p=<0.001 and OR 1.5, 95% CI 1.2:1.8, p=<0.001).

Chart B.30a. No GY diagnosis (n=241) and dysmenorrhoea severity associated with GI symptoms



*While still showing a general correlation, the smaller sample size reduces the clarity of patterns. Removal of morbidity clearly reduces observed morbidity, thus gynaecological conditions are *not* considered a confounder in this study, but rather an informer.

Table B.31a: ART and associated variables

Symptom	Odds ratio	95% CI	P-value
Ovulation pain	1.8	1.3:2.6	<0.001
Menstrual headache	1.4	1.1:1.9	0.02
Reflux/heartburn	1.3	1.0:1.8	0.04
Gestational headaches	1.5	1.1:2.1	0.01
Grief	1.5	1.1:2.1	0.02
Home owner	3.7	2.7:5.1	<0.001
18-28 year olds	0.1	0.1:0.2	<0.001
29-38 year olds	1.7	1.3:2.3	<0.001
39-48 year olds	1.7	1.3:2.3	<0.001
Married/domestic partnership	4.9	3.0:7.9	<0.001

Table B.31b: Infertility and associated variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (severe vs less)	1.6	1.3:2.0	<0.001
Dysmenorrhoea (last year)	1.9	1.2:3.0	0.008
Dysmenorrhoea*	1.7	1.3:2.2	<0.001
Dysmenorrhoea (last year)*	1.8	1.3:2.3	<0.001
Dysmenorrhoea pain medications	1.6	1.3:2.1	<0.001
Irregular periods (y/n)	1.4	1.1:1.8	0.003
Irregular menses (last year)	1.9	1.3:2.9	0.003
Heavy menses	1.4	1.1:1.7	0.006
Ovulation pain	2.2	1.7:2.9	<0.001
Menstrual headache	1.4	1.1:1.8	0.003
Menstrual migraine	1.3	1.1:1.7	0.02
PMS headaches	1.5	1.2:2.0	0.002
PMS migraines	1.3	1.0:1.6	0.04
PMS breast/nipple sensitivity	1.5	1.1:2.0	0.01
PMS bowel changes	1.5	1.1:2.2	0.02
GY diagnosis	3.9	2.9:5.1	<0.001
GY surgery	2.5	2.0:3.3	<0.001
Constipation (y/n)	1.4	1.1:1.9	0.008
Bloating (y/n)	1.7	1.1:2.6	0.01
Bloating*	1.5	1.2:1.9	<0.001
Abdominal pain (y/n)	1.8	1.3:2.6	<0.001
Abdominal pain*	1.6	1.3:2.0	<0.001
Reflux/heartburn	1.3	1.0:1.6	0.02
GI surgery	1.6	1.2:2.0	<0.001
Gestational headaches	1.8	1.4:2.4	<0.001
Gestational migraines	1.6	1.1:2.2	0.006
Depression*	1.3	1.0:1.6	0.05
Grief*	1.8	1.3:2.3	<0.001
Home owner	2.2	1.8:2.8	<0.001
18-28	0.3	0.2:0.4	<0.001
29-38	1.6	1.3:1.9	<0.001
39-48	1.6	1.2:2.0	<0.001
Married/domestic relationship	4.0	2.9:5.4	<0.001
Social life impacted by health	1.3	1.0:1.6	0.02

*Measured as 'none' and 'mild' compared to 'moderate' and 'severe'.

Table B.32. Morning sickness associated variables

Symptom	Odds ratio	95% CI	P-value
Irregular menses	1.8	1.0:3.4	0.05
Ovulation pain	1.6	1.1:2.3	0.02
Nausea/vomit	2.1	1.5:3.0	<0.001
Anger (all the time)	0.4	0.2:0.8	0.009
Anger (yes no)	3.6	1.4:7.8	0.005
Anger (not much/lots)	1.5	1.0:2.2	0.04
Birth complications/interventions	2.7	1.9:3.9	<0.001
Gestational constipation	2.3	1.6:3.4	<0.001
Gestational diarrhoea	1.7	1.1:2.6	0.01
Gestational headaches	2.6	1.7:3.8	<0.001
Gestational migraines	2.1	1.2:3.6	0.007
Gestational anxiety/depression	3.0	1.9:4.6	<0.001
General anxiety/depression	2.2	1.4:3.7	0.001

Table B.33: Gestational constipation and associated variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhea	1.7	1.0:2.9	0.04
Clotty menses	0.6	0.4:0.8	0.003
Constipation	2.6	1.9:3.6	<0.001
Bloating	1.5	1.0:2.3	0.05
Nausea/vomit	1.4	1.0:1.8	0.05
Reflux/heartburn	1.5	1.2:2.0	0.002
Birth complications	2.0	1.6:2.7	<0.001
Gestational diarrhoea	4.8	3.3:6.7	<0.001
Gestational anxiety/depression	2.0	1.5:2.7	<0.001
Gestational migraine	2.2	1.5:3.2	<0.001
Gestational headache	3.2	2.4:4.2	<0.001
Morning sickness	2.3	1.6:3.4	<0.001

Table B.34: Gestational diarrhoea and associated variables

Symptom	Odds ratio	95% CI	P-value
Ovulation pain	1.4	1.0:2.0	0.03
PMS	1.8	1.0:3.4	0.06
Diarrhoea	4.7	2.8:7.9	<0.001
Bloating	1.8	1.1:3.0	0.02
Reflux	1.5	1.2:2.1	0.004
Birth interventions/complications	1.5	1.1:2.0	0.008
Morning sickness	1.7	1.1:2.6	0.01
Gestational headaches	3.4	2.5:4.6	<0.001
Gestational migraines	3.1	2.2:4.3	<0.001
Gestational anxiety/depression	2.2	1.6:3.0	<0.001
Gestational constipation	4.8	3.3:6.7	<0.001

Table B.35: Gestational headaches and associated variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhea (severe vs less)	1.7	1.3:2.2	<0.001
Dysmenorrhoea*	2.0	1.5:2.8	<0.001
Irregular menses	2.2	1.3:3.6	0.004
Heavy menses	1.5	1.1:1.9	0.01
Ovulation pain	1.7	1.3:2.4	<0.001
Menstrual headaches	2.8	2.1:3.8	<0.001
Menstrual migraine	2.3	1.7:3.1	<0.001
PMS headaches	3.6	2.5:5.0	<0.001
PMS migraines	2.4	1.7:3.2	<0.001
Diarrhoea	2.0	1.4:2.8	<0.001
Bloating	1.7	1.1:2.5	0.02
Abdominal pain	1.5	1.1:2.2	0.02
Nausea/vomit	2.3	1.7:3.1	<0.001
Birth interventions/complications	1.6	1.2:2.0	0.001
Gestational diarrhoea	3.4	2.5:4.6	<0.001
Gestational constipation	3.2	2.4:4.2	<0.001
Morning sickness	2.6	1.7:3.8	<0.001
Gestational migraine	24.5	13.9:43.3	<0.001
Gestational anxiety/depression	2.6	2:3.4	<0.001

*Dichotomised as 'none and mild' compared to 'moderate and severe'.

Table B.36: Gestational migraines and associated variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (severe vs less)	2.5	1.7:3.5	<0.001
Dysmenorrhoea (yes/no)	3.6	1.3:10.1	0.01
Dysmenorrhoea*	2.8	1.8:4.4	<0.001
Heavy menses	2.0	1.4:2.8	<0.001
Ovulation pain	3.4	2.1:5.4	<0.001
Menstrual headache	4.2	2.6:6.6	<0.001
Menstrual migraine	6.3	4.3:9.2	<0.001
PMS	2.4	1.0:5.7	0.05
PMS headache	5.0	2.9:5.6	<0.001
PMS migraine	7.1	4.7:10.5	<0.001
PMS acne	1.7	1.1:2.6	0.01
Constipation (yes/no)	1.5	1.0:2.3	0.05
Constipation*	1.4	1.0:2.0	0.04
Diarrhoea	2.8	1.7:4.9	<0.001
Abdominal pain	2.8	1.6:4.9	<0.001
IBS	1.4	1.0:2.0	0.04
Nausea/vomit	3.0	1.9:4.7	<0.001
Reflux/heartburn	2.2	1.6:3.1	<0.001
Birth interventions/complications	1.4	1.0:1.9	0.05
Gestational headaches	24.5	13.9:43.3	<0.001
Gestational diarrhoea	3.1	2.2:4.3	<0.001
Gestational constipation	2.2	1.5:3.2	<0.001
Morning sickness	2.1	1.2:3.6	0.007
Gestational anxiety/depression	2.8	2.0:3.8	<0.001
General anxiety/depression (y/n)	2.2	1.1:4.1	0.02

General anxiety/depression*	1.6	1.2:2.4	0.004
Depression*	1.8	1.2:2.6	0.002
Grief	1.7	1.1:2.7	0.01
Rumination	1.5	1.1:2.1	0.02

*Dichotomised as 'none and mild' compared to 'moderate and severe'.

Table B.37: Gestational anxiety/depression and associated variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (severe vs less)	1.4	1.0:1.8	0.03
Dysmenorrhoea*	1.7	1.2:2.3	0.001
Ovulation pain	1.6	1.2:2.2	0.003
PMS breast/nipple sensitivity	1.4	1.0:2.0	0.04
PMS bowel changes	1.5	1.0:2.3	0.05
Constipation (y/n)	1.5	1.0:2.1	0.02
Constipation*	1.3	1.0:1.8	0.05
Diarrhoea	2.1	1.4:3.0	<0.001
Bloating	1.6	1.0:2.5	0.05
Abdominal pain	2.1	1.4:3.1	<0.001
IBS	1.4	1.1:1.8	0.02
Nausea/vomit	2.2	1.5:3.0	<0.001
Reflux/heartburn	1.6	1.2:2.2	<0.001
Anger (always vs less)	2.7	1.5:4.9	<0.001
Sadness	8.9	1.2:67.8	0.03
Depressed	2.7	1.9:3.8	<0.001
General anxiety/depression*	3.1	2.4:4.2	<0.001
Sorrow	1.8	1.3:2.4	<0.001
Fear	2.8	1.3:6.1	0.009
Rumination	2.6	1.4:4.7	0.002
Happiness	0.7	0.5:1.0	0.03
Morning sickness	3.0	1.9:4.6	<0.001
Gestational diarrhoea	2.2	1.6:3.0	<0.001
Gestational constipation	2.0	1.5:2.7	<0.001
Gestation headaches	2.6	2.0:3.4	<0.001
Gestational migraines	2.8	2.0:3.8	<0.001

*Dichotomised as 'none and mild' compared to 'moderate and severe'.

Table B.38: General anxiety/depression* and associated variables

Symptom	Odds ratio	95% CI	P-value
Dysmenorrhoea (severe vs less)	2.4	2.0:3.0	<0.001
Dysmenorrhoea (y/n)	2.3	1.5:3.5	<0.001
Dysmenorrhoea (last year y/n)	2.4	1.7:3.5	<0.001
Dysmenorrhoea*	2.7	2.1:3.3	<0.001
Dysmenorrhoea medications	2.4	1.9:2.9	<0.001
Irregular menses	1.5	1.1:2.1	0.02
Heavy menses	1.8	1.4:2.2	<0.001
Clotty menses	1.9	1.5:2.5	<0.001
Ovulation pain	1.6	1.3:2.0	<0.001
Menstrual headache	1.7	1.4:2.1	<0.001
Menstrual migraine	1.9	1.5:2.3	<0.001
PMS	2.1	1.4:3.1	<0.001
PMS headache	1.5	1.2:1.9	<0.001
PMS migraines	1.7	1.4:2.1	<0.001
PMS breast/nipple	1.4	1.1:1.8	0.01
PMS mood changes	3.9	2.2:7.0	<0.001
PMS bloating	2.0	1.3:3.1	0.001
PMS bowel changes	1.9	1.4:2.6	<0.001
PMS acne	1.7	1.3:2.2	<0.001
Constipation (y/n)	1.7	1.4:2.2	<0.001
Constipation*	2.0	1.7:2.4	<0.001
Diarrhoea	2.2	1.7:2.8	<0.001
Bloating	2.9	2.2:4.0	<0.001
Abdominal pain	3.2	2.4:4.2	<0.001
IBS	2.1	1.8:2.4	<0.001
Nausea/vomit	2.5	2.0:3.1	<0.001
Reflux/heartburn	1.8	1.5:2.1	<0.001
GI medications/supplements	1.5	1.3:1.8	<0.001
Anger (all vs less)	9.1	4.7:17.7	<0.001
Anger (y/n)	2.0	1.0:4.0	0.04
Sadness	13.6	3.2:58.2	<0.001
Depressed	11.0	8.3:14.7	<0.001
Sorrow	2.9	2.3:3.6	<0.001
Fear	7.9	3.9:16.2	<0.001
Rumination	6.2	3.8:10.2	<0.001
Gestational headache	1.3	1.0:1.7	0.03
Gestational migraine	1.6	1.2:2.4	0.004
Gestational anxiety/depression	3.1	2.4:4.2	<0.001
Difficulties breastfeeding	1.5	1.1:2.0	0.01
PND	5.0	3.6:7.0	<0.001
Happiness*	0.1	0.07:0.2	<0.001
Sadness*	7.8	6.1:9.9	<0.001
Depressed*	32.8	19.9:54	<0.001
Grief*	8.8	5.9:13.2	<0.001
Fear*	9.6	7.6:12.1	<0.001
Anger*	3.9	3.2:4.9	<0.001
Rumination*	6.2	5.0:7.8	<0.001
GY surgery	1.7	1.4:2.1	<0.001
GI surgery	1.7	1.3:2.2	<0.001

Gynaecological diagnosis	2.0	1.6:2.5	<0.001

*Dichotomised as 'none and mild' compared to 'moderate and severe', or for emotions, 'never and rarely' compared to 'often and always'.

Table B.39: GI and GY variables associated with specific emotions (none and rare vs often and always)

Emotion/symptom	Odds ratio	95% CI	P-value
Happiness			
Constipation (y/n)	0.6	0.4:0.8	0.003
Constipation*	0.6	0.4:0.7	<0.001
Bloating	0.5	0.3:0.9	0.01
Abdominal pain	0.4	0.2:0.6	<0.001
IBS	0.7	0.5:0.9	0.004
Nausea/vomit	0.5	0.3:0.7	<0.001
Reflux/heartburn	0.6	0.4:0.7	<0.001
GI medications	0.7	0.5:0.9	0.002
Dysmenorrhoea (severe and less)	0.5	0.4:0.7	<0.001
Dysmenorrhoea (y/n)	0.4	0.2:0.9	0.02
Dysmenorrhoea*	0.4	0.3:0.6	<0.001
Dysmenorrhoea medications	0.5	0.4:0.7	<0.001
Irregular menses	0.5	0.4:0.7	<0.001
Heavy menses	0.6	0.5:0.8	0.001
Clotty menses	0.5	0.4:0.8	0.002
Ovulation pain	0.6	0.5:0.9	0.008
Menstrual headache	0.8	0.6:1.0	0.05
Menstrual migraine	0.7	0.5:0.9	0.002
Gynaecological condition	0.5	0.4:0.7	<0.001
Gynaecological surgery	0.7	0.5:0.9	0.01
Sadness			
Constipation (y/n)	1.6	1.3:2.1	<0.001
Constipation*	2.0	1.6:2.4	<0.001
Diarrhoea	2.1	1.5:2.8	<0.001
Bloating	2.3	1.5:3.3	<0.001
Abdominal pain	2.6	1.8:3.5	<0.001
IBS	1.7	1.4:2.1	<0.001
Nausea/vomit	2.5	1.9:3.3	<0.001
Reflux/heartburn	1.8	1.5:2.3	<0.001
GI surgery	1.4	1.1:1.8	0.003
Dysmenorrhoea (severe and less)	2.7	2.1:3.3	<0.001
Dysmenorrhoea (y/n)	3.1	1.8:5.2	<0.001
Dysmenorrhoea*	2.7	2.1:3.5	<0.001
Dysmenorrhoea medications	2.5	2.0:3.2	<0.001
Irregular menses	1.8	1.4:2.2	<0.001
Heavy menses	1.6	1.3:2.0	<0.001
Clotty menses	1.9	1.4:2.6	<0.001
Ovulation pain	2.0	1.6:2.5	<0.001
Menstrual headache	1.8	1.4:2.2	<0.001
Menstrual migraine	1.9	1.5:2.4	<0.001
PMS	2.3	1.4:3.7	<0.001

GY condition	2.0	1.6:2.5	<0.001
GY surgery	1.6	1.3:2.0	<0.001
Depression			
Constipation (y/n)	1.6	1.2:2.2	0.001
Constipation**	2.1	1.7:2.6	<0.001
Diarrhoea	1.6	1.1:2.2	0.009
Bloating	2.8	1.7:4.5	<0.001
Abdominal pain	2.5	1.7:3.7	<0.001
IBS	1.5	1.2:1.9	<0.001
Nausea/vomit	2.7	2.0:3.8	<0.001
Reflux/heartburn	1.9	1.5:2.4	<0.001
Dysmenorrhoea (severe and less)	3.2	2.5:4.1	<0.001
Dysmenorrhoea (y/n)	5.8	2.4:12.9	<0.001
Dysmenorrhoea*	4.0	2.8:5.7	<0.001
Dysmenorrhoea medications	2.4	1.8:3.2	<0.001
GY surgery	1.6	1.3:2.1	<0.001
Irregular menses	1.7	1.4:2.2	<0.001
Heavy menses	2.0	1.6:2.6	<0.001
Clotty menses	2.0	1.4:2.9	<0.001
Ovulation pain	1.9	1.4:2.5	<0.001
Menstrual headache	1.4	1.1:1.8	0.004
Menstrual migraine	2.0	1.6:2.5	<0.001
PMS	1.8	1.1:3.1	0.03
GY condition	2.1	1.6:2.8	<0.001
GI surgery	1.4	1.1:1.9	0.008
Infertility	1.3	1.0:1.6	0.05
Grief			
Constipation*	2.2	1.7:2.8	<0.001
Diarrhoea	1.8	1.2:2.8	0.005
Bloating	2.1	1.2:3.6	0.009
Abdominal pain	2.5	1.5:4.1	<0.001
IBS	1.6	1.2:2.0	<0.001
Nausea/vomit	2.3	1.6:3.3	<0.001
Reflux/heartburn	1.6	1.2:2.1	<0.001
GI medications	1.3	1.0:1.7	0.03
GI surgery	1.6	1.2:2.2	0.001
Dysmenorrhoea (severe and less)	2.8	2.1:3.7	<0.001
Dysmenorrhoea (y/n)	6.7	2.1:21.3	0.001
Dysmenorrhoea*	2.6	1.8:3.7	<0.001
Dysmenorrhoea medications	1.9	1.4:2.7	<0.001
Irregular menses	1.8	1.4:2.4	<0.001
Heavy menses	1.9	1.4:2.5	<0.001
Clotty menses	1.7	1.1:2.6	0.009
Ovulation pain	2.1	1.5:2.9	<0.001
Menstrual headache	1.8	1.3:2.4	<0.001
Menstrual migraine	1.9	1.5:2.6	<0.001
GY condition	2.6	1.9:3.7	<0.001
GY surgery	2.2	1.6:3.0	<0.001
Infertility	1.8	1.3:2.3	<0.001

Fear			
Constipation (y/n)	1.5	1.2:2.0	<0.001
Constipation*	1.9	1.5:2.3	<0.001
Diarrhoea	1.9	1.5:2.6	<0.001
Bloating	2.8	1.9:3.9	<0.001
Abdominal pain	2.4	1.8:3.2	<0.001
IBS	1.9	1.6:2.3	<0.001
Nausea/vomit	2.5	1.9:3.2	<0.001
Reflux/heartburn	1.5	1.3:1.9	<0.001
GI medications	1.4	1.1:1.7	0.001
GI surgery	1.6	1.3:2.1	<0.001
Dysmenorrhoea (severe and less)	2.7	2.2:3.4	<0.001
Dysmenorrhoea (y/n)	2.6	1.7:4.0	<0.001
Dysmenorrhoea*	2.9	2.3:3.6	<0.001
Dysmenorrhoea medications	2.4	1.9:3.0	<0.001
Irregular menses	1.5	1.2:1.8	<0.001
Heavy menses	1.5	1.2:1.9	<0.001
Clotty menses	1.8	1.4:2.4	<0.001
Ovulation pain	1.6	1.3:2.0	<0.001
Menstrual headache	1.6	1.3:2.0	<0.001
Menstrual migraine	2.0	1.6:2.5	<0.001
PMS	2.0	1.3:3.0	0.002
GY condition	2.0	1.6:2.5	<0.001
GY surgery	1.7	1.4:2.1	<0.001
Anger*			
Constipation (y/n)	1.8	1.4:2.3	<0.001
Constipation*	1.7	1.4:2.1	<0.001
Diarrhoea	1.6	1.2:2.1	<0.001
Bloating	2.1	1.5:2.9	<0.001
Abdominal pain	2.4	1.8:3.2	<0.001
IBS	1.6	1.3:1.9	<0.001
Nausea/vomit	1.8	1.4:2.3	<0.001
Reflux/heartburn	1.4	1.1:1.7	0.002
GI medications	1.3	1.0:1.6	0.02
GI surgery	1.6	1.2:2.0	<0.001
Dysmenorrhoea (severe and less)	2.2	1.8:2.7	<0.001
Dysmenorrhoea (y/n)	2.0	1.3:3.2	0.002
Dysmenorrhoea*	2.2	1.8:2.9	<0.001
Dysmenorrhoea medications	1.8	1.4:2.2	<0.001
Irregular menses	1.4	1.1:1.7	0.002
Heavy menses	1.4	1.2:1.8	<0.001
Clotty menses	1.4	1.1:1.9	0.01
Ovulation pain	1.6	1.3:2.1	<0.001
Menstrual headache	1.6	1.3:1.9	<0.001
Menstrual migraine	1.9	1.5:2.3	<0.001
PMS	2.5	1.6:3.9	<0.001
GY condition	1.6	1.3:2.0	<0.001
GY surgery	1.7	1.4:2.1	<0.001

Rumination			
Constipation (y/n)	1.6	1.3:2.1	<0.001
Constipation*	1.7	1.4:2.1	<0.001
Diarrhoea	2.1	1.6:2.7	<0.001
Bloating	2.8	2.0:4.0	<0.001
Abdominal pain	2.9	2.1:3.8	<0.001
IBS	1.6	1.3:2.0	<0.001
Nausea/vomit	2.3	1.8:2.9	<0.001
Reflux/heartburn	1.4	1.1:1.7	0.002
GI medications	1.3	1.1:1.6	0.01
GI surgery	1.7	1.3:2.2	<0.001
Dysmenorrhoea (severe and less)	2.5	2:3.1.0	<0.001
Dysmenorrhoea (y/n)	2.5	1.6:3.8	<0.001
Dysmenorrhoea*	2.6	2.0:3.3	<0.001
Dysmenorrhoea medications	2.3	1.8:2.8	<0.001
Irregular menses	1.6	1.3:1.9	<0.001
Heavy menses	1.5	1.2:1.8	<0.001
Clotty menses	2.2	1.7:2.9	<0.001
Ovulation pain	1.6	1.3:2.0	<0.001
Menstrual headache	1.9	1.5:2.4	<0.001
Menstrual migraine	2.1	1.7:2.7	<0.001
PMS	2.4	1.6:3.7	<0.001
GY condition	1.6	1.3:2.0	<0.001
GY surgery	1.6	1.3:1.9	<0.001

*Constipation and dysmenorrhoea as measured 'none' and 'mild' compared to 'moderate' and 'severe'.
**Depression here is an expression of emotion, not a diagnosis of clinical depression.
***Women who expressed feeling angry 'all the time' had the following odds ratios: constipation (y/n) (OR 3.6, 95% CI 1.8:7.3, p=<0.001), constipation* (OR 1.8, 95% CI 1.2:2.7, p=0.002), bloating (OR 4.3, 95% CI 1.3:13.6, p=0.01), abdominal pain (OR 3.2, 95% CI 1.4:7.3, p=0.007), IBS (OR 2.1, 95% CI 1.4:3.1, p=<0.001), nausea/vomit (OR 4.1, 95% CI 2:8.5, p=<0.001), severe dysmenorrhoea (OR 2.3, 95% CI 1.5:3.5, p=<0.001), dysmenorrhoea* (OR2.9, 95% CI 1.6:5.4, p=<0.001), dysmenorrhoea medication use (OR 2.0, 95% CI 1.2:3.4, p=0.009), irregular menses (OR 1.9, 95% CI 1.2:2.8, p=0.004), clotty menses (OR 3.2, 95% CI 1.5:6.9, p=0.004), ovulation pain (OR 1.6, 95% CI 1.0:2.7, p=0.04), menstrual headaches (OR 1.6, 95% CI 1.1:2.6, p=0.03), menstrual migraine (OR 1.7, 95% CI 1.1:2.5, p=0.01), PMS (OR 8.1, 95% CI 1.1:58.4, p=0.04), GY diagnosis (OR 2.1, 95% CI 1.3:3.4, p=0.004) and GY surgery (OR 1.9, 95% CI 1.2:3.0, p=0.005), GI medication (OR 1.5, 95% CI 1.0:2.2, p=0.03) and GI surgery (OR 1.8, 95% CI 1.2:2.8, p=0.004).

Table B.40: Ethnicity comparisons on major variables:

Presence of variable	Caucasian (n=1718)	Other (n=282)
Dysmenorrhoea	94% (n=1284)	92% (n=192)
Irregular menses	51% (n=681)	53% (n=109)
Heavy menses	42% (n=544)	43% (n=87)
Clotty menses	81% (n=1030)	83% (n=166)
Ovulation pain	69% (n=892)	63% (n=126)
Menstrual headache	62% (n=796)	59% (n=118)
Menstrual migraine	34% (n=434)	40% (n=78)
PMS	93% (n=1197)	92% (n=180)
GY diagnosis	67% (n=856)	61% (n=117)
GY surgery**	39% (n=492)	49% (n=93)
Infertility	30% (n=405)	34% (n=68)
ART	16% (n=222)	11% (n=22)
Birth interventions/complications	66% (n=424)	61% (n=46)
Postnatal depression	41% (n=245)	54% (n=38)
Anxiety/depression (y/n)	90% (n=1515)	88% (n=243)
Anxiety/depression*	55% (n=925)	57% (n=159)
Constipation	78% (n=1303)	73% (n=197)
Diarrhoea**	84% (n=1404)	76% (n=205)
Bloating	90% (n=1487)	87% (n=230)
Abdominal pain**	86% (n=1421)	81% (n=213)
IBS**	44% (n=717)	33% (n=87)
Nausea/vomit	78% (n=1271)	73% (n=190)
Reflux/heartburn	57% (n=930)	52% (n=135)
GI medications**	38% (n=589)	31% (n=74)
GI surgery	21% (n=326)	18% (n=42)

*dichotomised as 'none and mild' compared to 'moderate and severe'.

**Significant difference noted. Caucasian's had a higher incidence of diarrhoea in this sample (OR 1.7, 95% CI 1.2:2.3, p=0.001), abdominal pain (OR 1.4, 95% CI 1.0:2.0, p=0.04) and IBS (OR 1.5, 95% CI 1.2:2.0, p=0.002), taking of GI medications (OR 1.4, 95% CI 1.0:1.8, p=0.04). And non-Caucasians had a higher risk of GY surgery (OR 1.5, 95% CI 1.1:2.1, p=0.007).

Table B.41: Country of residency comparisons on major variables:

Presence of variable	Australia (n=1408)	Other (n=627)
Dysmenorrhoea**	92% (n=1072)	97% (n=428)
Irregular menses	50% (n=576)	54% (n=232)
Heavy menses**	39% (n=433)	52% (n=214)
Clotty menses	80% (n=885)	84% (n=334)
Ovulation pain**	66% (n=727)	75% (n=309)
Menstrual headache**	59% (n=654)	68% (n=278)
Menstrual migraine**	31% (n=342)	45% (n=182)
PMS	93% (n=1017)	93% (n=380)
GY diagnosis** ***	62% (n=667)	79% (n=321)
PCOS**	31% (n=209)	17% (n=53)
Endometriosis/adenomyosis**	65% (n=431)	92% (n=293)
Amenorrhoea	7% (n=44)	7% (n=20)
Fibroids/polyps	22% (n=143)	22% (n=71)
Ovarian cysts**	48% (n=319)	64% (n=206)
Abnormal pap smear	29% (n=191)	26% (n=82)
GY surgery**	57% (n=607)	69% (n=279)
Infertility**	28% (n=313)	35% (n=166)
ART	16% (n=180)	14% (n=65)
Birth interventions/complications	67% (n=377)	59% (n=97)
Postnatal depression**	41% (n=215)	47% (n=71)
Anxiety/depression (y/n)	89% (n=1233)	91% (n=557)
Anxiety/depression* **	48% (n=659)	37% (n=227)
Constipation**	76% (n=1045)	81% (n=485)
Diarrhoea	83% (n=1136)	84% (n=503)
Bloating**	88% (n=1201)	92% (n=546)
Abdominal pain**	82% (n=1114)	93% (n=549)
IBS**	40% (n=535)	49% (n=285)
Nausea/vomit**	75% (n=1009)	83% (n=485)
Reflux/heartburn**	55% (n=731)	61% (n=356)
GI medications**	35% (n=440)	43% (n=232)
GI surgery**	19% (n=239)	26% (n=138)

*dichotomised as 'none and mild' compared to 'moderate and severe'.

** Statistically significant differences noted: Women living *in* Australia had a higher incidence of anxiety/depression (OR 1.5, 95% CI 1.3:1.9, p=<0.001) and PND (OR 1.4, 95% CI 1.1:1.9, p=0.02), and those who had a GY diagnosis had a higher incidence of PCOS (OR 2.3, 95% CI 1.7:3.2, p=<0.001), while women living *outside* of Australia had a higher incidence of constipation (OR 1.3, 95% CI 1.0:1.7, p=0.02), bloating (OR 1.6, 95% CI 1.1:2.2, p=0.007), abdominal pain (OR 3.0, 95% CI 2.1:4.2, p=<0.001), IBS (OR 1.4, 95% CI 1.2:1.8, p=<0.001), nausea/vomit (OR 1.6, 95% CI 1.2:2.0, p=<0.001), reflux/heartburn (OR 1.3, 95% CI 1.1:1.6, p=0.005), GI medications (OR 1.4, 95% CI 1.1:1.7, p=0.001), GI surgery (OR 1.5, 95% CI 1.2:1.9, p=0.002) and of those who had a GY diagnosis had a higher incidence of dysmenorrhoea (OR 2.5, 95% CI 1.4:4.5, p=0.002), heavy menses (OR 1.7, 95% CI 1.4:2.2, p=<0.001), ovulation pain (OR 1.6, 95% CI 1.2:2.1, p=<0.001), menstrual headache (OR 1.5, 95% CI 1.1:1.8, p=0.002), menstrual migraine (OR 1.8, 95% CI 1.4:2.3, p=<0.001), a GY diagnosis (OR 2.4, 95% CI 1.8:3.1, p=<0.001), GY surgery (OR 1.7, 95% CI 1.3:2.2, p=<0.001), infertility (OR 1.4, 95% CI 1.1:1.8, p=0.004), endometriosis/adenomyosis (OR 5.9, 95% CI 3.9:9.1, p=<0.001), ovarian cysts (OR 2.0, 95% CI 1.5:2.6, p=<0.001)

***Some of the differences noted may relate to the level of GY morbidity in those not living in Australia, which may be accounted for overseas participants being recruited through the kind efforts of the Endometriosis Research Center, an American-based organisation.

Table B.42: Home owners compared to non-homeowners≠

Variable	Odds ratio	95% CI	P-value
Age range 18-28	0.1	0.1:0.2	<0.001
Age range 29-38	1.6	1.4:1.9	<0.001
Age range 39-48	3.2	2.6:3.9	<0.001
Caucasian	1.9	1.5:2.5	<0.001
Living in Australia	1.3	1.0:1.5	0.02
Anxiety/depression*	0.5	0.4:0.6	<0.001
Anxiety/depression (y/n)	0.6	0.4:0.8	<0.001
Dysmenorrhoea (severe vs less)	0.5	0.4:0.6	<0.001
Dysmenorrhoea (y/n in previous year)	0.6	0.4:0.8	0.001
Dysmenorrhea (in previous year)*	0.5	0.4:0.6	<0.001
Dysmenorrhoea*	0.6	0.5:0.7	<0.001
Dysmenorrhoea medications	0.6	0.5:0.7	<0.001
Irregular menses	0.7	0.6:0.9	0.002
Heavy menses	0.8	0.7:1.0	0.03
Clotty menses	0.6	0.4:0.8	<0.001
PMS migraines	0.8	0.6:1.0	0.02
PMS breast/nipple sensitivity	0.7	0.5:0.9	0.007
PMS acne/breakouts	0.7	0.6:0.9	0.005
GY condition	0.8	0.6:1.0	0.01
Constipation*	0.8	0.7:1.0	0.03
Diarrhoea	0.7	0.5:0.9	0.002
Bloating	0.6	0.5:0.8	0.001
Abdominal pain	0.5	0.4:0.7	<0.001
IBS	0.8	0.7:1.0	0.04
Nausea/vomit	0.5	0.4:0.7	<0.001
Happiness**	1.8	1.4:2.4	<0.001
Anger (all the time vs less)	0.6	0.4:0.9	0.01
Anger**	0.7	0.6:0.8	<0.001
Sadness (y/n)	0.4	0.1:0.9	0.03
Sadness**	0.6	0.5:0.7	<0.001
Depression (y/n)	0.5	0.4:0.7	<0.001
Depression**	0.5	0.4:0.7	<0.001
Grief**	0.7	0.5:0.9	0.006
Sorrow (y/n)	0.7	0.6:0.9	0.001
Fear (y/n)	0.4	0.3:0.8	0.003
Fear**	0.5	0.4:0.6	<0.001
Excessive thoughts/churning (y/n)	0.5	0.3:0.8	0.001
Excessive thoughts/churning**	0.6	0.5:0.7	<0.001
Birth complications/interventions	1.6	1.2:2.1	0.001
Infertility	2.2	1.8:2.8	<0.001
ART	3.7	2.7:2.1	<0.001
Gestational constipation	1.5	1.1:2.0	0.005
Gestational anxiety/depression	0.6	0.4:0.8	<0.001
PND	0.7	0.5:1.0	0.03

≠'Other' were 'living with parents/in-laws', 'renting', 'student dormitory', or 'other'.
*Classified as 'none and mild' compared to 'moderate and severe'.

Table B.43: 18 to 28 year old age group variables

Variable	Odds ratio	95% CI	P-value
Caucasian	0.7	0.5:1.0	0.02
Anxiety/depression*	1.9	1.5:2.4	<0.001
Anxiety/depression (y/n)	1.7	1.1:2.4	0.01
Dysmenorrhoea (severe vs less)	2.0	1.6:2.5	<0.001
Dysmenorrhoea (y/n)	1.8	1.1:3.1	0.03
Dysmenorrhea (y/n in previous year)	1.8	1.2:2.8	0.01
Dysmenorrhoea*	2.2	1.7:3.0	<0.001
Dysmenorrhoea (in previous year)*	2.3	1.7:3.1	<0.001
Dysmenorrhoea medications	2.1	1.6:2.8	<0.001
Irregular menses	1.6	1.3:2.0	<0.001
Heavy menses	1.3	1.1:1.7	0.01
Clotty menses	1.6	1.2:2.2	0.004
PMS bloating	1.8	1.1:3.1	0.03
PMS breast/nipple sensitivity	1.4	1.0:1.9	0.05
PMS bowel changes	1.5	1.0:2.2	0.04
PMS acne/breakouts	2.0	1.5:2.8	<0.001
Constipation*	1.3	1.1:1.6	0.006
Diarrhoea	1.6	1.2:2.2	0.002
Bloating	2.0	1.3:2.9	<0.001
Abdominal pain	1.7	1.2:2.3	0.002
Nausea/vomit	2.4	1.8:3.1	<0.001
Anger (all the time vs less)	1.6	1.0:2.3	0.04
Anger**	1.3	1.0:1.6	0.05
Sadness**	1.5	1.2:1.8	0.001
Depression (y/n)	1.4	1.1:1.8	0.02
Depression**	1.5	1.2:1.9	0.002
Fear**	2.1	1.6:2.6	<0.001
Excessive thoughts/churning (y/n)	2.2	1.3:3.8	0.006
Excessive thoughts/churning**	1.8	1.4:2.2	<0.001
History of pregnancy	0.2	0.1:0.2	<0.001
Birth complications/interventions	0.4	0.2:0.6	<0.001
Infertility	0.3	0.2:0.4	<0.001
Unexplained infertility	0.4	0.2:0.9	0.02
ART	0.1	0.1:0.2	<0.001
Currently undergoing ART	4.8	1.2:18.4	0.02
Gestational diarrhoea	1.9	1.2:2.9	0.003

*Dichotomised as 'none and mild' vs 'moderate and severe'

**Dichotomised as 'never and occasionally' vs 'often and all the time'.

Table B.44: 29 to 38 year old age group variables

Variable	Odds ratio	95% CI	P-value
Home owner	1.6	1.4:1.9	<0.001
PMS breast/nipple sensitivity	0.8	0.6:1.0	0.04
History of pregnancy	1.6	1.3:2.0	<0.001
Infertility	1.6	1.3:1.9	<0.001
ART	1.7	1.3:2.3	<0.001
Gestational constipation	1.5	1.1:2.0	0.004
Gestational diarrhoea	1.9	1.4:2.6	<0.001
Gestational headaches	1.6	1.2:2.1	<0.001

*Dichotomised as 'none and mild' vs 'moderate and severe'

**Dichotomised as 'never and occasionally' vs 'often and all the time'.

Table B.45: 39 to 48 year old age group variables

Variable	Odds ratio	95% CI	P-value
Home owner	3.2	2.6:3.9	<0.001
Anxiety/depression*	0.6	0.4:0.8	<0.001
Anxiety/depression (y/n)	0.6	0.5:0.8	<0.001
Dysmenorrhoea (severe vs less)	0.5	0.4:0.6	<0.001
Dysmenorrhoea (y/n)	0.6	0.4:1.0	0.04
Dysmenorrhoea*	0.5	0.4:0.7	<0.001
Dysmenorrhoea (in previous year)*	0.5	0.4:0.6	<0.001
Dysmenorrhoea medications	0.5	0.4:0.7	<0.001
Irregular menses	0.8	0.6:1.0	0.02
PMS bowel changes	0.5	0.4:0.8	<0.001
PMS acne/breakouts	0.4	0.3:0.5	<0.001
GY condition	0.8	0.6:1.0	0.03
Constipation (y/n)	0.7	0.5:0.8	<0.001
Constipation*	0.7	0.5:0.8	<0.001
Diarrhoea	0.7	0.5:0.9	0.006
Bloating	0.6	0.5:0.9	0.004
Abdominal pain	0.6	0.5:0.8	0.002
Nausea/vomit	0.5	0.4:0.6	<0.001
Anger (all the time vs less)	0.4	0.2:0.7	0.001
Sadness**	0.6	0.5:0.8	<0.001
Fear (y/n)	0.5	0.3:0.9	0.03
Fear**	0.6	0.5:0.7	<0.001
Excessive thoughts/churning**	0.7	0.6:0.9	0.002
History of pregnancy	3.7	2.8:4.8	<0.001
Birth complications/interventions	1.4	1.1:1.9	0.02
Infertility	1.6	1.2:2.0	<0.001
Unexplained infertility	1.6	1.1:2.4	0.02
ART	1.7	1.3:2.3	<0.001
Currently undergoing ART	0.4	0.2:0.8	0.01
Gestational constipation	0.6	0.5:0.8	0.002
Gestational diarrhoea	0.5	0.4:0.7	<0.001
Gestational headache	0.5	0.4:0.7	<0.001

*Dichotomised as 'none and mild' vs 'moderate and severe'

**Dichotomised as 'never and occasionally' vs 'often and all the time'.

Table B.46: Education level (undergraduate and postgraduate vs less)

Variable	Odds ratio	95% CI	P-value
Home owner	1.3	1.1:1.6	0.001
18-28 years old	0.6	0.5:0.7	<0.001
29-38 years old	1.6	1.4:2.0	<0.001
Health limits social life	0.6	0.5:0.7	<0.001
GI surgery	0.7	0.5:0.8	<0.001
Irregular menses	0.8	0.6:1.0	0.02
GY condition	0.8	0.6:1.0	0.03
History of pregnancy	0.7	0.6:0.9	0.002
Dysmenorrhoea (severe vs less)	0.7	0.6:0.8	<0.001
Dysmenorrhoea*	0.7	0.6:0.9	0.002
Dysmenorrhoea (y/n in last year)	0.7	0.5:1.0	0.04
Dysmenorrhoea in last year*	0.6	0.5:0.8	<0.001
Heavy menses	0.6	0.5:0.8	<0.001
Clotty menses	0.7	0.5:0.9	0.01
Ovulation pain	0.8	0.6:1.0	0.02
Menstrual headache	0.8	0.6:1.0	0.02
Menstrual migraine	0.7	0.5:0.8	<0.001
PMS headaches	0.7	0.6:0.9	0.007
PMS migraine	0.7	0.6:0.9	0.001
PMS breast/nipple sensitivity	0.7	0.5:0.9	0.003
PMS acne/breakouts	0.7	0.6:1.0	0.02
Bloating	0.7	0.5:0.9	0.008
Abdominal pain	0.8	0.6:1.0	0.03
IBS	0.8	0.7:1.0	0.03
Reflux/heartburn	0.8	0.7:1.0	0.03
Anger (all the time)	0.4	0.3:0.7	<0.001
Anger**	0.8	0.6:1.0	0.02
Depression	0.6	0.5:0.7	<0.001
Depression**	0.5	0.4:0.7	<0.001
Sadness**	0.6	0.5:0.8	<0.001
Sorrow	0.7	0.5:0.8	<0.001
Grief**	0.7	0.5:0.9	0.004
Fear**	0.7	0.6:0.8	<0.001
Excessive thinking/churning	0.7	0.5:0.8	<0.001
Excessive thinking/churning**	0.7	0.5:0.8	<0.001
Gestational migraine	0.7	0.5:1.0	0.05
Anxiety/depression (y/n)	0.7	0.5:0.9	0.01
Anxiety/depression*	0.6	0.5:0.8	<0.001

*Dichotomised as 'none and mild' vs 'moderate and severe'

**Dichotomised as 'never and occasionally' vs 'often and all the time'.

Table B.47: Relationship status (married or domestic partnership vs other)

Variable	Odds ratio	95% CI	P-value
Home owner	5.9	4.7:7.5	<0.001
Living in Australia	1.5	1.2:1.9	<0.001
Living in Australia or the USA	1.4	1.1:1.9	0.007
Caucasian	1.9	1.4:2.5	<0.001
18-28 years old	0.4	0.3:0.5	<0.001
29-38 years old	1.7	1.4:2.1	<0.001
39-48 years old	1.3	1.0:1.7	0.03
Infertility	3.9	2.9:5.4	<0.001
ART	4.9	3.0:7.9	<0.001
History of pregnancy	4.6	3.6:5.9	<0.001
Pregnancy constipation	2.5	1.7:3.7	<0.001
Pregnancy headache	1.6	1.1:2.3	0.02
Birth complications/interventions	2.1	1.5:3.2	<0.001
Dysmenorrhoea (severe vs less)	0.7	0.6:0.9	0.002
Dysmenorrhoea*	0.7	0.5:0.9	0.007
Dysmenorrhoea (y/n in last year)	0.6	0.4:1.0	0.04
Dysmenorrhoea in last year*	0.7	0.5:0.9	0.005
Clotty menses	0.6	0.4:0.9	0.004
Menstrual migraine	0.8	0.6:1.0	0.03
PMS migraine	0.7	0.6:1.0	0.02
Bloating	0.6	0.4:0.9	0.01
Abdominal pain	0.7	0.5:1.0	0.02
IBS	0.7	0.6:0.9	0.004
Nausea/vomit	0.6	0.5:0.8	<0.001
Happiness	20.0	1.0:389.0	0.05
Happiness**	1.9	1.4:2.4	<0.001
Depression	0.5	0.4:0.7	<0.001
Depression**	0.6	0.5:0.7	<0.001
Sadness	0.5	0.4:0.7	<0.001
Sadness**	0.6	0.5:0.7	<0.001
Grief**	0.7	0.5:0.9	0.007
Fear	0.5	0.2:1.0	0.05
Fear**	0.6	0.5:0.8	<0.001
Excessive thinking/churning	0.6	0.4:1.0	0.05
Excessive thinking/churning**	0.6	0.5:0.8	<0.001
Gestational migraine			
Anxiety/depression (y/n)	0.5	0.4:0.8	0.003
Anxiety/depression*	0.6	0.5:0.7	<0.001

*Dichotomised as 'none and mild' vs 'moderate and severe'

**Dichotomised as 'never and occasionally' vs 'often and all the time'.

Table B.48: 18-28 year age group (n=505), GI and GY variable associations

Variable	Odds ratio	95% CI	P-value
Dysmenorrhoea (y/n)			
Constipation (y/n)	3.7	1.4:9.9	0.009
Constipation*	4.0	1.1:14.1	0.03
Diarrhoea (y/n)	4.6	1.6:13.0	0.004
Diarrhoea*	3.1	1:9:6.0	0.05
Bloating*	3.5	1.3:9.3	0.01
Abdominal pain (y/n)	12.6	4.6:35.0	<0.001
Abdominal pain*	6.3	2.2:18.4	<0.001
Nausea/vomit (y/n)	5.2	1.9:14.3	0.001
Nausea/vomit*	4.9	1.4:17.2	0.01
Dysmenorrhoea (severe vs less)			
Constipation (y/n)	3.8	2.3:6.2	<0.001
Constipation*	4.0	2.5:6.2	<0.001
Diarrhoea*	2.0	1.3:3.0	<0.001
Bloating (y/n)	6.3	2.6:15.2	<0.001
Bloating*	5.2	3.3:8.2	<0.001
Abdominal pain (y/n)	17.9	6.8:46.6	<0.001
Abdominal pain*	11.3	6.9:18.4	<0.001
IBS (y/n)	2.3	1.5:3.4	<0.001
IBS*	2.7	1.6:4.3	<0.001
Nausea/vomit (y/n)	4.3	2.4:7.8	<0.001
Nausea/vomit*	5.4	3.4:8.4	<0.001
Dysmenorrhoea*			
Constipation (y/n)	3.9	2.2:6.7	<0.001
Constipation*	3.8	2.0:7.1	<0.001
Diarrhoea (y/n)	2.4	1.2:4.7	0.01
Diarrhoea*	2.3	1.3:4.0	0.003
Bloating (y/n)	5.3	2.4:11.8	<0.001
Bloating*	4.6	2.7:8.0	<0.001
Abdominal pain (y/n)	9.0	4.5:17.8	<0.001
Abdominal pain*	9.7	5.4:17.5	<0.001
IBS (y/n)	2.0	1.1:3.5	0.02
IBS*	2.6	1.3:5.1	0.006
Nausea/vomit (y/n)	6.9	3.7:12.8	<0.001
Nausea/vomit*	5.3	2.8:10.0	<0.001
Reflux/heartburn (y/n)	1.8	1.1:3.0	0.03
Irregular menses			
Constipation (y/n)	2.0	1.2:3.2	0.006
Constipation*	1.6	1.1:2.4	0.02
Bloating*	1.8	1.2:2.8	0.006
Abdominal pain (y/n)	2.1	1.1:4.1	0.02
Abdominal pain*	1.7	1.1:2.6	0.01
Nausea/vomit (y/n)	2.1	1.2:3.8	0.01
Nausea/vomit*	1.8	1.2:2.7	0.004
Reflux/heartburn (y/n)	1.5	1.0:2.3	0.04

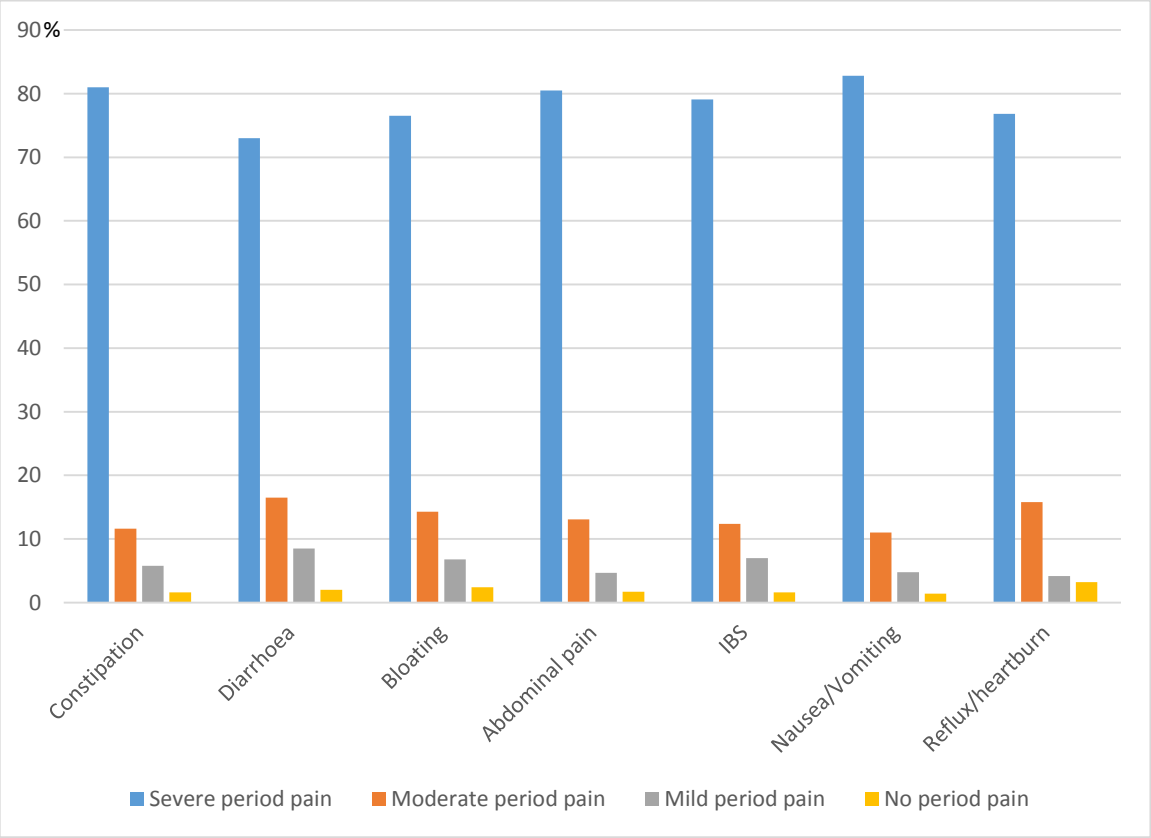
Irregular menses (last year)			
Constipation (y/n)	2.2	1.1:4.7	0.04
Heavy menses (y/n)			
Constipation (y/n)	1.7	1.1:2.9	0.03
Diarrhoea*	1.6	1.1:2.4	0.02
Bloating (y/n) Bloating*	3.6 2.2	1.4:9.0 1.4:3.4	0.007 <0.001
Abdominal pain (y/n) Abdominal pain*	4.0 4.5	1.8:9.0 2.8:7.4	<0.001 <0.001
Nausea/vomit (y/n) Nausea/vomit*	6.3 2.6	2.9:13.7 1.8:3.9	<0.001 <0.001
Reflux/heartburn*	1.7	1.1:2.8	0.02
Clotty menses (y/n)			
Constipation (y/n) Constipation*	2.5 2.0	1.5:4.0 1.3:2.9	<0.001 0.001
Diarrhoea*	1.8	1.2:2.7	0.005
Bloating (y/n) Bloating*	3.5 3.3	1.5:7.9 2.1:5.1	0.003 <0.001
Abdominal pain (y/n) Abdominal pain*	4.1 3.8	2.0:8.2 2.5:6.0	<0.001 <0.001
IBS (y/n)	1.5	1.0:2.3	0.03
Nausea/vomit (y/n) Nausea/vomit*	2.9 2.6	1.6:5.2 1.7:3.9	<0.001 <0.001
Ovulation pain (y/n)			
Constipation (y/n) Constipation*	2.1 2.2	1.3:3.6 1.4:3.5	0.003 <0.001
Diarrhoea (y/n)	1.9	1.0:3.6	0.04
Bloating (y/n) Bloating*	8.4 3.5	3.5:20.5 2.2:5.5	<0.001 <0.001
Abdominal pain (y/n) Abdominal pain*	3.7 4.9	1.9:7.3 3.1:7.9	<0.001 <0.001
Nausea/vomit (y/n) Nausea/vomit*	6.5 3.1	3.5:12.2 1.9:4.8	<0.001 <0.001
Reflux/heartburn (y/n)	1.6	1.0:2.4	0.04
Ovulation pain*			
Constipation (y/n) Constipation*	2.1 3.3	1.3:3.5 2.2:5.1	0.004 <0.001
Diarrhoea*	1.8	1.2:2.6	0.005
Bloating (y/n) Bloating*	9.5 6.1	2.8:31.9 3.7:10.0	<0.001 <0.001
Abdominal pain (y/n) Abdominal pain*	23.5 13.2	5.6:98.7 7.3:24.0	<0.001 <0.001
IBS (y/n) IBS*	2.1 1.9	1.4:3.2 1.2:3.0	<0.001 0.003
Nausea/vomit (y/n)	6.8	3.1:15.0	<0.001

Nausea/vomit*	4.7	3.1:7.1	<0.001
Menstrual headaches (y/n)			
Constipation*	2.5	1.6:3.8	<0.001
Diarrhoea (y/n)	1.8	1.0:3.4	0.05
Diarrhoea*	2.0	1.3:3	0.001
Bloating (y/n)	7.5	3.0:19	<0.001
Bloating*	3.0	2.0:4.7	<0.001
Abdominal pain (y/n)	4.9	2.4:10	<0.001
Abdominal pain*	4.8	3.0:7.6	<0.001
IBS (y/n)	2.3	1.5:3.6	<0.001
IBS*	3.3	2.0:5.4	<0.001
Nausea/vomit (y/n)	3.7	2.0:6.8	<0.001
Nausea/vomit*	2.9	1.9:4.4	<0.001
Menstrual headaches*			
Constipation (y/n)	2.7	1.5:4.6	<0.001
Constipation*	3.2	2.1:4.8	<0.001
Diarrhoea (y/n)	3.2	1.5:6.9	0.002
Diarrhoea*	3.1	2.1:4.8	<0.001
Bloating (y/n)	20.1	2.8:153.2	0.003
Bloating*	3.9	2.4:6.4	<0.001
Abdominal pain (y/n)	66.3	4.0:1086.8	0.003
Abdominal pain*	9.0	4.9:16.9	<0.001
IBS (y/n)	1.8	1.2:2.7	0.004
IBS*	2.7	1.7:4.1	<0.001
Nausea/vomit (y/n)	6.2	2.6:15	<0.001
Nausea/vomit*	3.7	2.4:5.7	<0.001
Reflux/heartburn*	2.0	1.2:3.2	0.006
Menstrual migraines (y/n)			
Constipation (y/n)	2.0	1.2:3.5	0.01
Constipation*	2.5	1.7:3.8	<0.001
Diarrhoea (y/n)	2.2	1.0:4.5	0.03
Diarrhoea*	1.9	1.3:2.8	0.002
Bloating (y/n)	4.0	1.4:11.8	0.01
Bloating*	3.2	2.0:5.3	<0.001
Abdominal pain (y/n)	3.9	1.6:9.6	0.003
Abdominal pain*	4.1	2.4:6.9	<0.001
IBS (y/n)	2.1	1.4:3.2	<0.001
IBS*	2.6	1.7:4.0	<0.001
Nausea/vomit (y/n)	2.6	1.3:5.2	0.008
Nausea/vomit*	2.9	1.9:4.5	<0.001
Menstrual migraines*			
Constipation*	2.8	1.7:4.6	<0.001
Diarrhoea*	2.3	1.4:3.7	<0.001
Bloating (y/n)	8.4	1.2:62.7	0.04
Bloating*	4.6	2.3:9.2	<0.001
Abdominal pain (y/n)	6.1	1.4:25.7	0.01
Abdominal pain*	7.8	3.3:18.5	<0.001

IBS (y/n) IBS*	2.2 2.8	1.4:3.6 1.7:4.6	0.001 <0.001
Nausea/vomit (y/n) Nausea/vomit*	8.4 3.3	2.0:35.1 2.0:5.5	0.004 <0.001
Reflux/heartburn*	1.9	1.1:3.2	0.02
PMS (y/n)			
Bloating (y/n) Bloating*	7.0 2.8	2.8:17.9 1.3:6.0	<0.001 0.01
Abdominal pain*	2.6	1.2:5.6	0.02
PMS*			
Constipation (y/n) Constipation*	1.8 1.8	1.0:3.0 1.1:3.0	0.04 0.02
Bloating (y/n) Bloating*	8.4 3.9	3.7:19.5 2.4:6.3	<0.001 <0.001
Abdominal pain (y/n) Abdominal pain*	5.0 4.9	2.5:9.7 3.0:8.0	<0.001 <0.001
Nausea/vomit (y/n) Nausea/vomit*	3.1 3.4	1.7:5.8 2.0:5.6	<0.001 <0.001

*Dichotomised as 'none and mild' vs 'moderate and severe'
**A history of irregular periods
***Accumulative odds ratios = 654.6, the mean of which is **4.7**. (group average mean = 3.5)

Graph B.1: 18-28 age group: Dysmenorrhoea severity and associated GI symptoms



*all associations were significant at p=0.02 or lower.

Table B.49: 29-38 year age group (n=1003), GI and GY variable associations

Variable	Odds ratio	95% CI	P-value
Dysmenorrhoea (y/n)			
Constipation*	3.6	1.7:7.5	<0.001
Diarrhoea (y/n)	2.4	1.3:4.5	0.005
Diarrhoea*	3.0	1.5:5.9	0.002
Bloating (y/n)	3.9	2.0:7.4	<0.001
Bloating*	3.0	1.7:5.4	<0.001
Abdominal pain (y/n)	2.5	1.3:4.7	0.005
Abdominal pain*	6.2	3.2:12.3	<0.001
IBS (y/n)	2.9	1.5:5.7	0.002
IBS*	3.8	1.5:9.8	0.005
Nausea/vomit (y/n)	3.1	1.7:5.5	<0.001
Nausea/vomit*	5.2	2.1:13.3	<0.001
Reflux/heartburn (y/n)	3.0	1.7:5.5	<0.001
Reflux/heartburn*	2.4	1.0:5.8	0.05
Dysmenorrhoea (severe vs less)			
Constipation (y/n)	2.5	1.8:3.6	<0.001
Constipation*	3.5	2.6:4.8	<0.001
Diarrhoea (y/n)	2.7	1.8:4.0	<0.001
Diarrhoea*	3.3	2.5:4.4	<0.001
Bloating (y/n)	7.4	4.0:13.5	<0.001
Bloating*	5.2	3.8:7.2	<0.001
Abdominal pain (y/n)	8.6	5.0:14.7	<0.001
Abdominal pain*	10.3	7.4:14.5	<0.001
IBS (y/n)	2.4	1.8:3.3	<0.001
IBS*	2.9	2.1:4.1	<0.001
Nausea/vomit (y/n)	2.9	2.1:4.2	<0.001
Nausea/vomit*	3.3	2.4:4.5	<0.001
Reflux/heartburn (y/n)	2.4	1.8:3.2	<0.001
Reflux/heartburn*	1.9	1.4:2.7	<0.001
Dysmenorrhoea*			
Constipation (y/n)	1.9	1.4:2.8	<0.001
Constipation*	3.3	2.3:4.8	<0.001
Diarrhoea (y/n)	2.7	1.9:4.0	<0.001
Diarrhoea*	3.9	2.7:5.6	<0.001
Bloating (y/n)	5.2	3.3:8.3	<0.001
Bloating*	5.2	3.7:7.3	<0.001
Abdominal pain (y/n)	4.5	3.0:6.8	<0.001
Abdominal pain*	9.5	6.6:13.8	<0.001
IBS (y/n)	2.6	1.8:3.6	<0.001
IBS*	3.1	2.0:4.8	<0.001
Nausea/vomit (y/n)	2.8	2.0:4.0	<0.001
Nausea/vomit*	3.6	2.4:5.4	<0.001
Reflux/heartburn (y/n)	1.9	1.4:2.6	<0.001
Reflux/heartburn*	2.1	1.4:3.2	<0.001
Irregular menses			

Constipation (y/n)	1.9	1.3:2.7	<0.001
Constipation*	1.9	1.4:2.5	<0.001
Diarrhoea (y/n)	1.6	1.1:2.3	0.02
Diarrhoea*	1.7	1.2:2.2	<0.001
Bloating*	1.4	1.1:1.9	0.02
Abdominal pain (y/n)	2.0	1.3:3.0	0.001
Abdominal pain*	2.0	1.5:2.7	<0.001
IBS*	1.6	1.2:2.2	0.004
Nausea/vomit (y/n)	1.7	1.2:2.5	0.002
Nausea/vomit*	2.2	1.7:3.0	<0.001
Reflux/heartburn (y/n)	1.8	1.4:2.4	<0.001
Reflux/heartburn*	1.7	1.3:2.5	0.001
Irregular menses (last year)			
Diarrhoea (y/n)	2.0	1.0:3.9	0.04
Diarrhoea*	1.9	1.1:3.2	0.02
Abdominal pain (y/n)	3.2	1.6:6.4	<0.001
Abdominal pain*	2.0	1.2:3.4	0.007
Nausea/vomit (y/n)	2.0	1.1:3.7	0.03
Reflux/heartburn*	2.0	1.0:3.8	0.04
Heavy menses (y/n)			
Constipation (y/n)	1.9	1.3:2.7	<0.001
Constipation*	1.7	1.3:2.3	<0.001
Diarrhoea (y/n)	1.8	1.2:2.8	0.004
Diarrhoea*	1.8	1.3:2.4	<0.001
Bloating (y/n)	2.6	1.5:4.4	<0.001
Bloating*	2.3	1.7:3.1	<0.001
Abdominal pain (y/n)	2.8	1.8:4.4	<0.001
Abdominal pain*	2.8	2.0:3.8	<0.001
IBS (y/n)	1.4	1.0:1.9	0.03
Nausea/vomit (y/n)	1.9	1.3:2.8	<0.001
Nausea/vomit*	2.2	1.6:3.0	<0.001
Clotty menses (y/n)			
Constipation (y/n)	1.8	1.3:2.5	0.001
Constipation*	1.8	1.4:2.5	<0.001
Diarrhoea (y/n)	1.8	1.2:2.6	0.004
Diarrhoea*	2.1	1.6:2.9	<0.001
Bloating (y/n)	5.4	3.0:9.7	<0.001
Bloating*	4.0	2.9:5.5	<0.001
Abdominal pain (y/n)	4.5	2.8:7.3	<0.001
Abdominal pain*	4.9	3.6:6.7	<0.001
IBS (y/n)	1.7	1.3:2.3	<0.001
IBS*	1.7	1.2:2.3	0.002
Nausea/vomit (y/n)	2.3	1.6:3.2	<0.001
Nausea/vomit*	2.2	1.6:3.0	<0.001
Reflux/heartburn (y/n)	1.4	1.1:1.9	0.02
Reflux/heartburn*	1.5	1.0:2.0	0.03
Ovulation pain (y/n)			

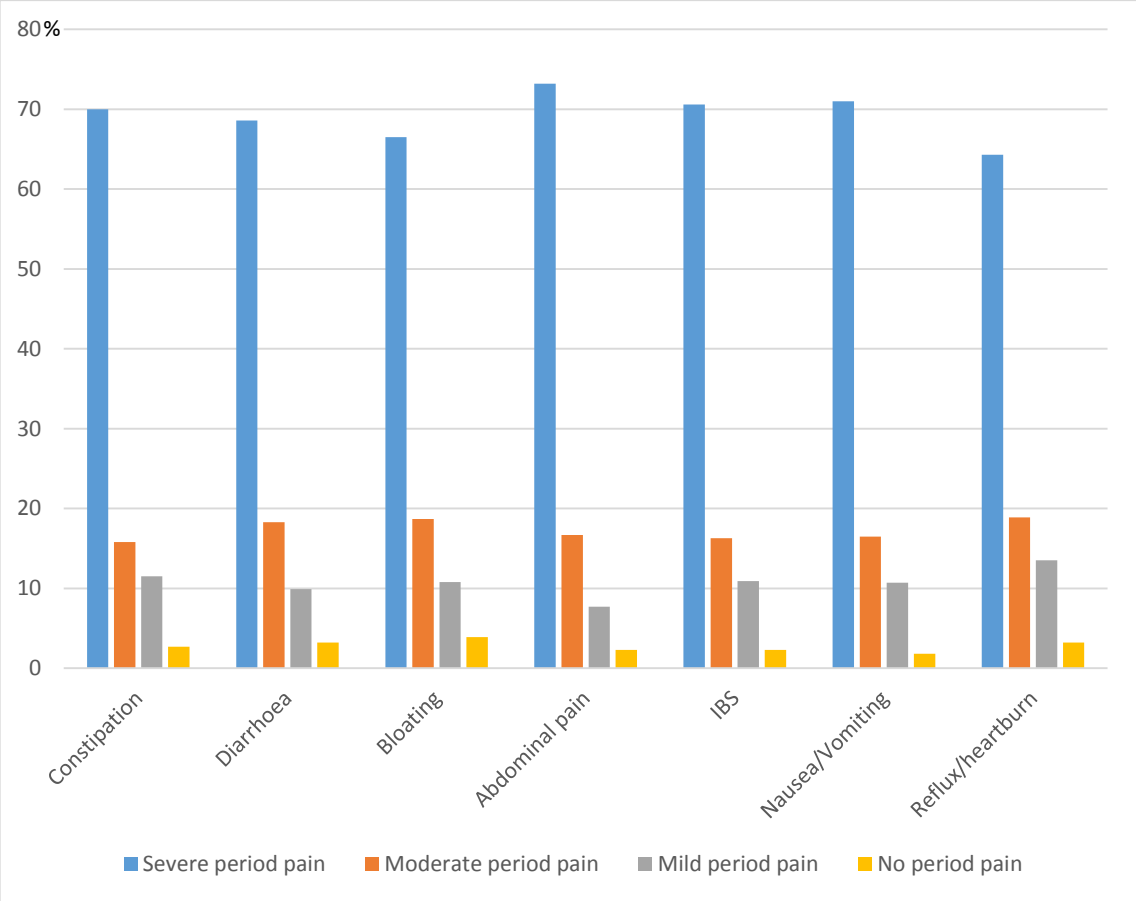
Constipation (y/n)	2.4	1.7:3.4	<0.001
Constipation*	2.2	1.6:3.0	<0.001
Diarrhoea (y/n)	2.2	1.5:3.2	<0.001
Diarrhoea*	2.3	1.7:3.2	<0.001
Bloating (y/n)	5.2	3.2:8.5	<0.001
Bloating*	4.0	2.9:5.5	<0.001
Abdominal pain (y/n)	4.3	2.8:6.5	<0.001
Abdominal pain*	5.3	3.8:7.4	<0.001
IBS (y/n)	2.3	1.6:3.2	<0.001
IBS*	2.3	1.5:3.3	<0.001
Nausea/vomit (y/n)	2.7	1.9:3.8	<0.001
Nausea/vomit*	3.2	2.2:4.7	<0.001
Reflux/heartburn (y/n)	1.7	1.2:2.3	<0.001
Ovulation pain*			
Constipation (y/n)	2.0	1.4:2.9	<0.001
Constipation*	2.0	1.5:2.7	<0.001
Diarrhoea (y/n)	1.8	1.2:2.7	0.004
Diarrhoea*	2.6	2.0:3.5	<0.001
Bloating (y/n)	4.6	2.5:8.3	<0.001
Bloating*	3.9	2.8:5.4	<0.001
Abdominal pain (y/n)	5.1	3.0:8.5	<0.001
Abdominal pain*	7.2	5.1:10.2	<0.001
IBS (y/n)	2.1	1.5:2.8	<0.001
IBS*	2.3	1.7:3.2	<0.001
Nausea/vomit (y/n)	2.9	2.0:4.2	<0.001
Nausea/vomit*	3.5	2.5:4.7	<0.001
Reflux/heartburn (y/n)	2.0	1.5:2.7	<0.001
Reflux/heartburn*	1.5	1.0:2.0	0.03
Menstrual headaches (y/n)			
Constipation (y/n)	2.1	1.5:3.0	<0.001
Constipation*	1.7	1.2:2.2	0.001
Diarrhoea (y/n)	2.1	1.4:3.1	<0.001
Diarrhoea*	1.9	1.4:2.6	<0.001
Bloating (y/n)	2.8	1.7:4.5	<0.001
Bloating*	2.9	2.2:4.0	<0.001
Abdominal pain (y/n)	4.2	2.7:6.5	<0.001
Abdominal pain*	3.1	2.3:4.2	<0.001
IBS (y/n)	1.9	1.4:2.6	<0.001
IBS*	3.0	2.2:4.3	<0.001
Nausea/vomit (y/n)	3.1	2.2:4.5	<0.001
Nausea/vomit*	2.4	1.7:3.3	<0.001
Reflux/heartburn (y/n)	1.7	1.3:2.3	<0.001
Reflux/heartburn*	1.7	1.2:2.4	0.005
Menstrual headaches*			
Constipation (y/n)	2.2	1.5:3.3	<0.001
Constipation*	2.2	1.6:3.0	<0.001
Diarrhoea (y/n)	1.7	1.1:2.6	0.01
Diarrhoea*	1.8	1.3:2.4	<0.001
Bloating (y/n)	6.1	2.9:12.9	<0.001

Bloating*	3.6	2.6:5.1	<0.001
Abdominal pain (y/n)	6.8	3.6:12.9	<0.001
Abdominal pain*	4.4	3.1:6.2	<0.001
IBS (y/n)	1.7	1.2:2.3	<0.001
IBS*	2.0	1.5:2.8	<0.001
Nausea/vomit (y/n)	4.6	2.9:7.4	<0.001
Nausea/vomit*	3.3	2.4:4.5	<0.001
Reflux/heartburn (y/n)	1.9	1.4:2.6	<0.001
Reflux/heartburn*	1.8	1.3:2.6	<0.001
Menstrual migraines (y/n)			
Constipation (y/n)	3.0	1.9:4.6	<0.001
Constipation*	2.1	1.6:2.9	<0.001
Diarrhoea (y/n)	1.9	1.2:2.9	0.007
Diarrhoea*	2.0	1.5:2.8	<0.001
Bloating (y/n)	3.1	1.6:5.8	<0.001
Bloating*	3.1	2.2:4.4	<0.001
Abdominal pain (y/n)	6.9	3.4:13.8	<0.001
Abdominal pain*	4.4	3.0:6.2	<0.001
IBS (y/n)	2.0	1.5:2.7	<0.001
IBS*	2.0	1.5:2.8	<0.001
Nausea/vomit (y/n)	4.1	2.6:6.7	<0.001
Nausea/vomit*	3.1	2.2:4.2	<0.001
Reflux/heartburn (y/n)	2.1	1.6:2.9	<0.001
Reflux/heartburn*	1.8	1.3:2.6	<0.001
Menstrual migraines*			
Constipation (y/n)	3.6	2.0:6.5	<0.001
Constipation*	2.3	1.6:3.3	<0.001
Diarrhoea (y/n)	1.8	1.0:3.2	0.04
Diarrhoea*	2.2	1.5:3.1	<0.001
Bloating (y/n)	4.1	1.6:10.3	0.003
Bloating*	3.1	2.0:4.8	<0.001
Abdominal pain (y/n)	16.4	4.0:67.1	<0.001
Abdominal pain*	4.3	2.7:6.8	<0.001
IBS (y/n)	1.8	1.2:2.6	0.002
IBS*	2.0	1.4:2.9	<0.001
Nausea/vomit (y/n)	7.3	3.3:15.9	<0.001
Nausea/vomit*	4.0	2.7:5.7	<0.001
Reflux/heartburn (y/n)	2.7	1.8:4.1	<0.001
Reflux/heartburn*	2.0	1.4:3.0	<0.001
PMS (y/n)			
Constipation (y/n)	1.9	1.1:3.5	0.03
Diarrhoea (y/n)	3.2	1.8:5.8	<0.001
Diarrhoea*	3.8	1.9:7.6	<0.001
Bloating (y/n)	5.0	2.7:9.2	<0.001
Bloating*	3.7	2.1:6.6	<0.001
Abdominal pain (y/n)	4.4	2.5:7.9	<0.001
Abdominal pain*	3.2	1.8:5.6	<0.001
IBS (y/n)	2.5	1.3:4.7	0.005
Nausea/vomit (y/n)	2.5	1.4:4.5	0.001

Nausea/vomit*	3.7	1.7:8.4	0.001
PMS*			
Constipation (y/n) Constipation*	1.6 2.2	1.1:2.3 1.5:3.1	0.02 <0.001
Diarrhoea (y/n) Diarrhoea*	2.7 3.7	1.8:4.1 2.6:5.4	<0.001 <0.001
Bloating (y/n) Bloating*	7.5 5.1	4.5:12.5 3.7:7.2	<0.001 <0.001
Abdominal pain (y/n) Abdominal pain*	6.0 5.3	3.9:9.2 3.8:7.5	<0.001 <0.001
IBS (y/n) IBS*	2.6 3.0	1.9:3.7 1.9:4.6	<0.001 <0.001
Nausea/vomit (y/n) Nausea/vomit*	2.5 3.0	1.7:3.6 2.0:4.4	<0.001 <0.001
Reflux/heartburn (y/n) Reflux/heartburn*	1.6 1.8	1.1:2.1 1.2:2.8	0.006 0.005

*Dichotomised as 'none and mild' vs 'moderate and severe'
**A history of irregular periods
***Accumulative odds ratios = 595.5, the mean of which is **3.1**. (group average mean = 3.5)

Graph B.2: 29-38 age group: Dysmenorrhoea severity and associated GI symptoms



*all associations were significant at p=0.001 or lower.

Table B.50: 39-48 year age group (n=527), GI and GY variable associations

Variable	Odds ratio	95% CI	P-value
Dysmenorrhoea (y/n)			
Constipation (y/n)	2.1	1.0:4.4	0.04
Constipation*	4.8	1.4:16.2	0.01
Diarrhoea (y/n)	3.9	1.9:8.1	<0.001
Diarrhoea*	2.7	1.0:7.1	0.05
Bloating*	4.1	1.8:9.3	<0.001
Abdominal pain (y/n)	4.1	2.0:8.6	<0.001
Abdominal pain*	3.1	1.3:7.0	0.008
IBS (y/n)	4.8	1.8:12.8	0.002
Nausea/vomit (y/n)	2.2	1.1:4.5	0.03
Nausea/vomit*	4.4	1.0:19.0	0.04
Dysmenorrhoea (severe vs less)			
Constipation (y/n)	2.5	1.5:4.0	<0.001
Constipation*	3.3	2.1:5.3	<0.001
Diarrhoea (y/n)	2.1	1.2:3.6	0.01
Diarrhoea*	2.3	1.5:3.5	<0.001
Bloating (y/n)	4.0	1.8:8.7	<0.001
Bloating*	4.3	2.7:6.7	<0.001
Abdominal pain (y/n)	3.2	1.8:5.8	<0.001
Abdominal pain*	4.7	3.0:7.3	<0.001
IBS (y/n)	2.0	1.3:3.0	0.002
IBS*	2.8	1.7:4.5	<0.001
Nausea/vomit (y/n)	2.2	1.4:3.4	<0.001
Nausea/vomit*	4.6	2.7:7.7	<0.001
Reflux/heartburn (y/n)	2.0	1.3:3.1	0.001
Reflux/heartburn*	2.2	1.3:3.8	0.003
Dysmenorrhoea*			
Constipation (y/n)	2.5	1.6:3.9	<0.001
Constipation*	3.3	1.9:5.5	<0.001
Diarrhoea (y/n)	2.3	1.4:3.9	0.001
Diarrhoea*	2.1	1.3:3.4	0.002
Bloating (y/n)	3.4	1.9:6.4	<0.001
Bloating*	3.8	2.5:6.0	<0.001
Abdominal pain (y/n)	2.9	1.7:4.7	<0.001
Abdominal pain*	4.9	3.1:7.7	<0.001
IBS (y/n)	2.2	1.4:3.3	<0.001
IBS*	2.7	1.5:4.7	<0.001
Nausea/vomit (y/n)	2.1	1.3:3.2	0.001
Nausea/vomit*	3.8	2.0:7.1	<0.001
Reflux/heartburn (y/n)	1.6	1.0:2.4	0.03
Irregular menses*			
Abdominal pain (y/n)	0.6	0.4:1.0	0.05
Nausea/vomit (y/n)	0.5	0.3:0.8	0.002
Reflux/heartburn (y/n)	0.6	0.4:0.9	0.02

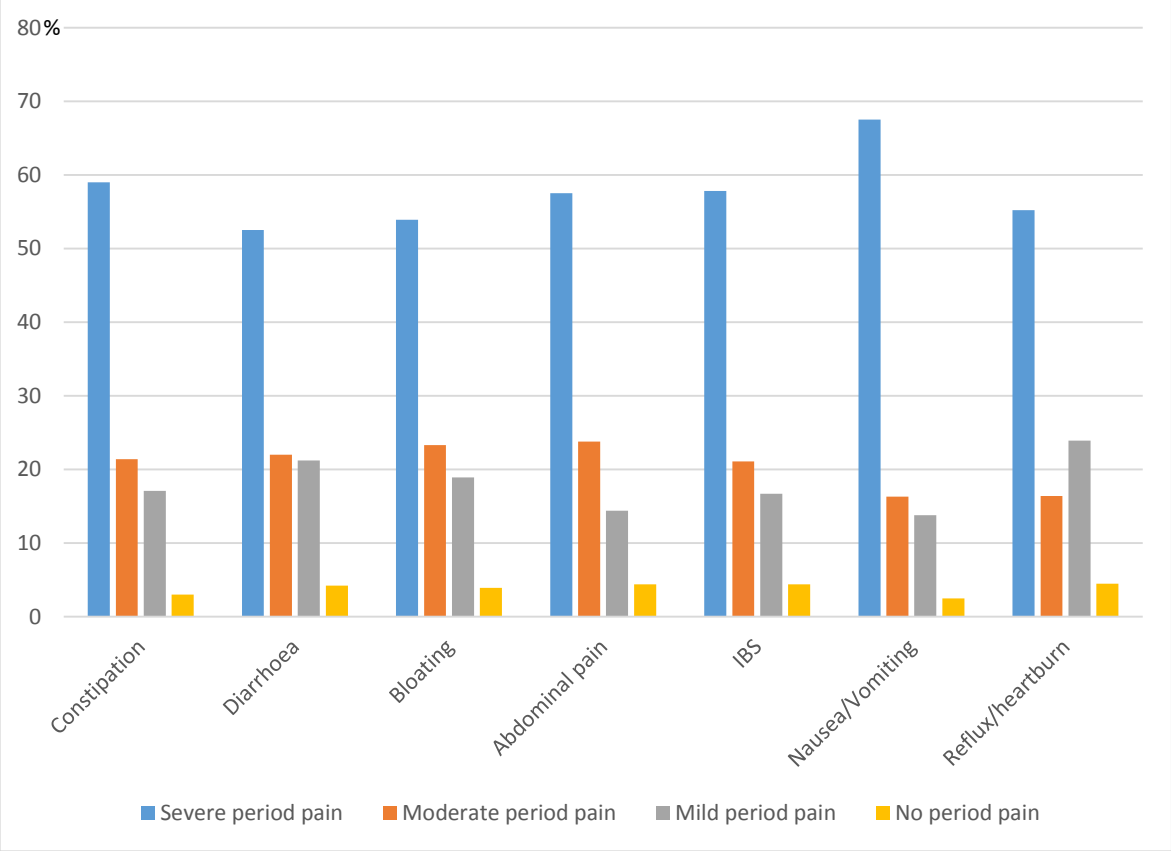
Irregular menses (last year)			
Bloating (y/n)	3.9	1.5:9.8	0.005
Nausea/vomit*	3.1	1.0:9.2	0.05
Heavy menses (y/n)			
Constipation*	2.0	1.2:3.1	0.004
Diarrhoea (y/n)	1.9	1.1:3.4	0.02
Bloating*	2.0	1.3:3.1	0.002
Abdominal pain (y/n)	1.7	1.0:3.0	0.05
IBS*	1.7	1.0:2.8	0.04
Reflux/heartburn (y/n)	2.1	1.4:3.3	<0.001
Clotty menses (y/n)			
Constipation*	2.5	1.6:4.0	<0.001
Diarrhoea (y/n)	2.1	1.2:3.6	0.007
Diarrhoea*	1.8	1.1:2.8	0.01
Bloating*	3.5	2.2:5.4	<0.001
Abdominal pain (y/n)	3.1	1.8:5.4	<0.001
Abdominal pain*	2.5	1.6:3.8	<0.001
IBS*	2.0	1.2:3.3	0.005
Nausea/vomit*	1.8	1.1:3.1	0.02
Reflux/heartburn (y/n)	1.6	1.0:2.4	0.04
Ovulation pain (y/n)			
Constipation (y/n)	1.9	1.2:3.1	0.006
Constipation*	2.1	1.3:3.5	0.004
Diarrhoea (y/n)	1.8	1.1:3.1	0.02
Bloating (y/n)	3.7	2.6:8.0	<0.001
Bloating*	2.9	1.9:4.6	<0.001
Abdominal pain (y/n)	4.9	2.8:8.3	<0.001
Abdominal pain*	3.0	1.9:4.7	<0.001
IBS (y/n)	2.0	1.2:3.1	0.004
IBS*	2.0	1.1:3.5	0.01
Nausea/vomit (y/n)	1.9	1.2:3.0	0.004
Nausea/vomit*	3.5	1.8:6.8	<0.001
Reflux/heartburn*	2.1	1.1:4.0	0.02
Ovulation pain*			
Constipation (y/n)	1.7	1.0:2.8	0.03
Constipation*	2.1	1.3:3.4	0.001
Diarrhoea (y/n)	3.8	1.9:7.6	<0.001
Diarrhoea*	3.3	2.1:5.3	<0.001
Bloating (y/n)	3.3	1.5:7.2	0.003
Bloating*	3.5	2.2:5.6	<0.001
Abdominal pain (y/n)	8.7	3.7:20.7	<0.001
Abdominal pain*	6.7	4.1:11.0	<0.001
IBS (y/n)	2.2	1.4:3.4	<0.001
IBS*	2.7	1.6:4.5	<0.001
Nausea/vomit (y/n)	2.1	1.3:3.4	0.002
Nausea/vomit*	4.6	2.7:7.9	<0.001

Reflux/heartburn (y/n) Reflux/heartburn*	1.7 3.5	1.1:2.7 2.0:6.2	0.01 <0.001
Menstrual headaches (y/n)			
Constipation*	1.7	1.0:2.7	0.03
Diarrhoea (y/n) Diarrhoea*	2.1 1.9	1.3:3.6 1.2:3.0	0.005 0.01
Bloating (y/n) Bloating*	3.3 2.1	1.8:6.2 1.3:3.2	<0.001 0.001
Abdominal pain (y/n) Abdominal pain*	2.3 2.4	1.4:3.9 1.6:3.8	0.001 <0.001
IBS*	2.0	1.1:3.4	0.01
Nausea/vomit (y/n) Nausea/vomit*	1.8 3.8	1.1:2.7 2.0:7.2	0.01 <0.001
Menstrual headaches*			
Constipation*	1.8	1.1:2.9	0.01
Diarrhoea (y/n) Diarrhoea*	2.8 3.4	1.5:5.4 2.1:5.4	0.002 <0.001
Bloating (y/n) Bloating*	3.1 3.3	1.4:6.7 2.1:5.4	0.006 <0.001
Abdominal pain (y/n) Abdominal pain*	2.2 3.5	1.2:4.1 2.2:5.5	0.009 <0.001
IBS (y/n) IBS*	2.0 3.2	1.3:3.1 1.9:5.3	0.003 <0.001
Nausea/vomit (y/n) Nausea/vomit*	2.3 5.7	1.4:3.7 3.3:10.0	<0.001 <0.001
Reflux/heartburn (y/n) Reflux/heartburn*	1.9 1.9	1.2:3.0 1.1:3.4	0.005 0.02
Menstrual migraines (y/n)			
Diarrhoea (y/n) Diarrhoea*	2.1 2.3	1.1:3.8 1.4:3.6	0.02 <0.001
Bloating (y/n) Bloating*	2.5 2.3	1.2:5.4 1.4:3.6	0.02 <0.001
Abdominal pain (y/n) Abdominal pain*	2.4 2.7	1.3:4.4 1.7:4.3	0.006 <0.001
IBS (y/n) IBS*	2.2 2.5	1.4:3.5 1.5:4.1	<0.001 <0.001
Nausea/vomit (y/n) Nausea/vomit*	3.0 4.7	1.8:5.0 2.7:8.1	<0.001 <0.001
Menstrual migraines*			
Constipation (y/n) Constipation*	2.0 2.0	1.0:3.7 1.2:3.4	0.04 0.01
Diarrhoea*	1.9	1.1:3.3	0.02
Bloating (y/n) Bloating*	3.2 2.8	1.1:9.1 1.6:5.0	0.03 <0.001
Abdominal pain*	3.2	1.8:5.5	<0.001
IBS*	2.3	1.3:4.1	0.003
Nausea/vomit (y/n)	2.7	1.5:5.0	0.002

Nausea/vomit*	5.9	3.3:10.6	<0.001
Reflux/heartburn (y/n) Reflux/heartburn*	2.3 2.7	1.3:4.0 1.5:5.0	0.003 0.001
PMS (y/n)			
Bloating (y/n)	4.0	1.7:9.7	0.002
Abdominal pain (y/n)	3.9	1.7:8.9	0.001
PMS*			
Constipation (y/n) Constipation*	2.6 2.3	1.6:4.1 1.3:3.7	<0.001 0.002
Diarrhoea (y/n) Diarrhoea*	3.1 3.0	1.8:5.3 1.8:5.2	<0.001 <0.001
Bloating (y/n) Bloating*	4.3 4.2	2.3:8.2 2.6:6.6	<0.001 <0.001
Abdominal pain (y/n) Abdominal pain*	2.5 2.8	1.5:4.2 1.7:4.3	<0.001 <0.001
IBS*	2.4	1.4:4.4	0.002
Nausea/vomit (y/n) Nausea/vomit*	2.1 2.2	1.3:3.2 1.2:3.9	0.001 0.01

*Dichotomised as 'none and mild' vs 'moderate and severe'
**A history of irregular periods
***Accumulative odds ratios = 396.3, the mean of which is **2.8**. (group average mean = 3.5)

Graph B3: 39-48 age group: Dysmenorrhoea severity and associated GI symptoms



*all associations were significant at p=0.02 or lower.

Appendix C: Complete WSU online survey

Welcome to the Women's Health Survey by Western Sydney University

You are invited to participate in this study by Western Sydney University.

The purpose of this study is to explore common symptoms impacting women's health, in particular symptoms involving the digestive and reproductive systems. Our aim is to examine relationships between body systems and stages in women's health. We are collecting data from women aged between 18 and 48 years of age.

This research is part of a Masters thesis at Western Sydney University, examining how Western medicine and Chinese medicine view women's health and healthcare. Chinese medicine considers health in terms of 'patterns of disharmony', where body systems are interrelated. Western medicine uses the term 'comorbidity' to describe the same phenomena, yet the study of comorbidity in women's health is limited.

This survey will ask demographic questions, detailed questions about digestion and menstruation, and if applicable, questions regarding fertility and pregnancy. We will also ask some questions about mental health, medications and treatments. Please complete each question, and respond with the answer that best reflects your experience. Please share this survey link with any family or friends that may be interested in contributing to the study of women's health.

This survey is completely anonymous. By clicking 'next' below you are indicating your consent to participate. This survey will take approximately 10 to 15 minutes to complete.

If you would like to be a part of further interview research discussing your symptoms, please add your details in any of the places provided during the survey. We are particularly interested in women who report significant gastrointestinal and gynaecological difficulties. A telephone or Skype interview would be recorded for transcription and would be based on responses to the survey, discussing any issues in more detail. All survey data is anonymous, and interview data will be de-identified (that is, any name or other identifying information such as contact information will be removed so nobody will be able to know that it is you who has responded). It may not be possible to interview all those who provide their details.

This research has been approved by the Western Sydney Human Ethics Committee, approval number: H11434. If you have any concerns regarding this study, you may contact the Ethics Committee via the contact details below.

Office of Research Services
Phone: +61 2 4736 0229
Fax: +61 2 4736 0013
Email: humanethics@uws.edu.au

If you are concerned about any of your health experiences and would like some help, you may like to contact:

- your nearest Women's Health Centre or Community Health Centre

- your General Practitioner for advice about who would be the best person in your community for you to talk to.

If you feel distressed now and would like to talk to someone, you could ring Lifeline on 13 11 14. Kind regards, Western Sydney University team:

Teja A. Jaensch (B.Hlth.Sc. TCM, BA.Int.Studies - China, Dip.Hunyuan)
Dr Suzanne Cochrane, Lecturer, School of Science and Health, Western Sydney University
Professor Caroline Smith, Researcher, National Institute of Complementary Medicine
For more information about this study, please contact Teja at: T.Jaensch@westernsydney.edu.au

General demographic information

These questions will let us know a little about who comprises our sample.

* 1. What is your gender?

◯ Female

◯ Male

◯ Gender neutral

* 2. Please indicate your age range:

◯ Younger than 18 years ◯ 18 to 28 years ◯ 29 to 38 years ◯ 39 to 48 years ◯ 49 years or older

* 3. Which of the following categories best describes your employment status (please choose the most correct response)?

◯ Student

◯ Employed, working full-time

◯ Employed, working part-time

◯ Not employed, looking for work

◯ Not employed, NOT looking for work

◯ Stay at home parent

◯ Retired

◯ Disabled, not able to work

◯ Other (please specify)

* 4. What is your country of birth?

◯ Australia ◯ Brazil ◯ Canada ◯ China ◯ France ◯ Germany ◯ India ◯ Italy ◯ Japan

◯ Mexico ◯ New Zealand ◯ Russia ◯ Spain ◯ United Kingdom ◯ United States

◯ Other (please specify)

* 5. In what country do you live?

* 6. What is your ethnicity? (You can choose multiple options)

* 7. Which of the following best describes your housing situation?

◯ Living with parents/in-laws ◯ Renting ◯ Home owner ◯ Other (please specify)

* 8. What is the highest level of education you have completed?

* 9. Which of the following best describes your current relationship status?

○ Married or in a domestic partnership ○ Widowed ○ Divorced or separated ○ Single

○ Other (please specify)

* 10. In general, how would you rate your overall health?

○ Excellent ○ Very good ○ Good ○ Fair ○ Poor

* 11. To what extent do physical or emotional health issues interfere with your normal social activities?

○ Extremely ○ Quite a bit ○ Moderately ○ Slightly ○ Not at all

* 12. In the past year, have you felt anxious or depressed?

Yes, severely Yes, moderately Yes, mildly No

These questions ask about your gastrointestinal and digestive health. We will ask about both severity and frequency of symptoms.

Definitions:

Constipation: difficulty in passing stools: either infrequent and/or incomplete and/or slow and/or hard stools.

* 13. In the last year, have you experienced constipation?

No Yes, mildly Yes, moderately Yes, severely

* 14. How often do you experience constipation?

Daily Weekly Monthly Unpredictable

Definitions:

Diarrhoea: The frequent passage of loose, watery stools.

* 15. In the last year, have you experienced diarrhoea?

No Yes, mildly Yes, moderately Yes, severely

* 16. How often do you experience diarrhoea?

Daily Weekly Monthly Unpredictable

Definitions:

Bloating: feeling swollen and/or distended in the abdominal region.

* 17. In the last year, have you experienced bloating?

No Yes, mildly Yes, moderately Yes, severely

* 18. How often do you experience bloating?

Daily Weekly Monthly Unpredictable

Definitions:

Abdominal pain: any discomfort felt between your ribs and your pelvis.

* 19. In the last year, have you experienced abdominal pain?

No Yes, mildly Yes, moderately Yes, severely

* 20. How often do you experience abdominal pain?

Daily Weekly Monthly Unpredictable

* 21. Do you have a history of irritable bowel syndrome (IBS: bloating, abdominal pain and varied bowel habits)?

No Yes, mildly Yes, moderately Yes, severely

* 22. How often do you experience symptoms of IBS?

Daily Weekly Monthly Unpredictable

Definitions:

Nausea: feeling sick in the stomach, not wanting to eat, and feeling like you may vomit. Vomiting: to eject the contents of ones stomach out through the mouth.

* 23. In the past year, have you experienced nausea or vomiting?

No Yes, mildly Yes, moderately Yes, severely

* 24. How often do you experience nausea or vomiting?

Daily Weekly Monthly Unpredictable

Definitions:

Reflux/Heartburn: a burning sensation in the stomach, often extending up towards the throat, and/or a burning feeling in the chest, sometimes associated with an acidic taste in the mouth.

* 25. In the past year, have you reflux or heartburn?

No Yes, mildly Yes, moderately Yes, severely

* 26. How often do you experience reflux or heartburn?

Daily Weekly Monthly Unpredictable

* 27. Please select the best answer regarding your diet:

◯ Vegan (no animal products) ◯ Vegetarian (no meat)

◯ Omnivore (eats animal and vegetable/fruit products) ◯ Carnivore (only eats animal products)

◯ Other (please specify)

* 28. Do your digestive system symptoms change at different times of your menstrual cycle?

◯ Yes ◯ No ◯ Unsure ◯ I don't have a menstrual cycle

* 29. Please tell us which of your digestive system symptoms get worse or change during your menstrual cycle:

* 30. Do you take any medicines (supplements or medications) for your digestive symptoms?

◯ Yes ◯ No

You can use the generic term if (for example: laxatives, reflux medication), if you do not have the

specific information.

31. Please tell us what digestive medicines you use

Definitions:

Digestive system surgery: could be, but is not limited to, that which affects your: oesophagus, stomach, liver, gall bladder, pancreas, small intestine, appendix, large intestine and/or rectum.

* 32. Have you had any surgery for your digestive system?

◯ Yes ◯ No

33. Please tell us what digestive system surgeries you have had:

* 34. What other treatments do you use for your digestive system?

You have just completed the section of the survey on digestive health. Questions regarding your menstrual cycle will be asked in the following section.

Further interview research may be undertaken at a later date, exploring issues of digestion further. This interview would expand on how you responded to the questions above. Please let us know if you would be interested in participating in this future study.

* 35. Would you consider being part of further interview research about your case?

◯ Yes ◯ No ◯ Unsure

36. Please let us know how best to contact you:

Name:

Email:

Phone number:

The following pages ask about your menstrual history and health. There are questions on both the severity of your symptoms, and also the frequency of them.

* 37. At what age did you get your first period?

38. Do you still get your period?

◯ Yes ◯ No

39. Please tell us why you do not get a period:

◯ I'm on the contraceptive pill ◯ Menopause ◯ Hysterectomy

◯ Currently pregnant/recently gave birth (please answer subsequent menstrual questions in relation to your periods before pregnancy)

Other (please specify)

* 40. Do you have a history of period pain?

Yes, severely Yes, moderately Yes, mildly No

* 41. Have you experienced period pain in the past year?

Yes, severely Yes, moderately Yes, mildly No

* 42. Out of your last six periods, how many of them were painful?

None 1 out of 6 2 out of 6 3 out of 6 4 out of 6 5 out of 6 6 out of 6

* 43. Where do you commonly feel the pain (choose all that apply)?

* 44. In the past year, have you used pain medications for your period?

◯ Yes ◯ No

* 45. How often do you use period pain medications?

Occasionally Every second period Every period

* 46. Please tell us what pain medications you use:

* 47. Do you have a history of irregular periods (a week shorter or longer than usual)?

◯ Yes ◯ No

* 48. Have you experienced irregular periods in the past year?

Yes, tends to come late Yes, tends to come early Yes, comes at various times No

* 49. What is the usual length of your menstrual cycle?

◯ 20 days or shorter ◯ 21 to 25 days ◯ 26 to 30 days ◯ 31 to 35 days

◯ 36 days or longer ◯ Varied length

* 50. When your period starts, how long does the bleeding usually last?

◯ No bleeding at all ◯ 1 day ◯ Up to 2 days ◯ Up to 3 days ◯ Up to 4 days ◯ Up to 5 days ◯ Up to 6 days ◯ Up to 7 days ◯ 8 days or longer ◯ Varied length

Definitions:

Heavy periods: also called menorrhagia, a condition where menstrual blood flow is very heavy (more than 80mls of blood per month), requiring frequent changing of menstrual pads or tampons to avoid leakage, including during the night.

* 51. How would you describe your periods?

Very heavy Heavy Moderate Light Very light Varied

* 52. Out of your last six periods, how many of them were heavy?

None 1 out of 6 2 out of 6 3 out of 6 4 out of 6 5 out of 6 6 out of 6

Definitions:

Clotty menstrual flow: menstrual blood containing semisolid gel-like clots. Clots can be very small or large.

* 53. In the last year, have you experienced clotty periods?

Yes, severely Yes, moderately Yes, mildly No Unsure

* 54. Out of your last six periods, how many of them were clotty?

None 1 out of 6 2 out of 6 3 out of 6 4 out of 6 5 out of 6 6 out of 6

* 55. In the past year, have you experienced mid-cycle ovulation pain?

Yes, severely Yes, moderately Yes, mildly No

* 56. Out of your last six menstrual cycles, how many times did you have ovulation pain?

None 1 out of 6 2 out of 6 3 out of 6 4 out of 6 5 out of 6 6 out of 6

* 57. In the last year, have you experienced menstrual related headaches?

Yes, severely Yes, moderately Yes, mildly No

* 58. Out of your last six menstrual cycles, how many times did you have menstrual related headaches?

None 1 out of 6 2 out of 6 3 out of 6 4 out of 6 5 out of 6 6 out of 6

Definitions:

Migraine: a severe headache which last for hours or days, often preceded by visual disturbances, strange tastes or smells, numbness, and/or dizziness. May be accompanied by nausea, vomiting, chills, frequent urination, sweating, swelling, and fatigue.

* 59. In the last year, have you experienced menstrual related migraines?

Yes, severely Yes, moderately Yes, mildly No

* 60. Out of your last six menstrual cycles, how many times did you have menstrual related migraines?

None 1 out of 6 2 out of 6 3 out of 6 4 out of 6 5 out of 6 6 out of 6

* 61. In the past year, have you experienced premenstrual symptoms (PMS), such as headaches, sore breasts, mood changes, bloating, bowel changes, and/or skin changes in the week prior to your period?

Yes, severely Yes, moderately Yes, mildly No

* 62. Out of your last six menstrual cycles, how often did you have PMS?

None 1 out of 6 2 out of 6 3 out of 6 4 out of 6 5 out of 6 6 out of 6

Please select the most correct response for each symptom.

* 63. Please rate the severity of the premenstrual symptoms you commonly experienced over your last six menstrual cycles:

Some methods used in menstrual health can impact how you experience premenstrual symptoms, your periods, and may contribute to digestive symptoms.

* 64. In the past year, have you used any of the following methods:

* 65. Please tell us why you use/used these methods:

Definitions:

Gynaecological conditions: such as polycystic ovaries (PCO) or syndrome (PCOS), endometriosis, adenomyosis, fibroids, cysts, polyps, abnormal pap smear results, and amenorrhoea (no periods).

* 66. Have you ever been diagnosed with a gynaecological condition?

◯ Yes ◯ No

* 67. Please indicate which of the following you have been diagnosed with (please respond to each option):

Definitions:

Gynaecological surgery: such as a laparoscopy, ablation or excision of endometriosis, hysterectomy, ovaries removed, removal of abnormal cervical cells, dilation and curettage (D&C) and tubal ligation.

* 68. Have you ever had any gynaecological surgery?

◯ No ◯ Yes

* 69. Please indicate which procedures (please respond to each option):

* 70. What other treatments do you use for your reproductive system?

Fertility questions

* 71. Have you ever experienced problems with fertility (tried unsuccessfully to fall pregnant for more than 12 months)?

◯ Yes ◯ No

* 72. Please tell us about your infertility experience (please respond to each option):

Assisted reproductive technology (ART) is the technology used to achieve pregnancy with procedures such as fertility medication, artificial insemination, in vitro fertilization (IVF) and surrogacy.

* 73. Have you ever used Assisted Reproductive Technologies (ART)?

◯ Yes ◯ No

* 74. Are you currently undergoing ART?

◯ Yes ◯ No ◯ Other (please specify)

75. Please tell us which ART procedures you have had:

* 76. What other treatments do you use for your fertility?

You have now completed the sections on the reproductive system and fertility. There are only a few more questions, asked in the following pages.

Pregnancy questions

These next pages ask about any pregnancies you may have had, along with associated symptoms.

* 79. Have you ever been pregnant?

◯ Yes ◯ No

* 80. How many times have you been pregnant?

○ 1 time ○ 2 times ○ 3 times ○ 4 times ○ 5 or more times

* 81-85. Please tell us the outcome of your pregnancy(ies):

* 86. Did you experience any birth interventions or difficulties when giving birth?

○ Yes ○ No, I did not experience any difficulties or interventions

○ I haven't given birth ○ Other

Other (please specify)

* 87. Please indicate which birthing interventions you experienced:

88. Please describe any difficulties you experienced during birth (if you prefer not to answer, just press 'next' below):

* 89. In the year after giving birth, were you diagnosed or did you experience postnatal depression or anxiety?

○ Yes ○ No ○ Unsure ○ Other (please specify)

* 90. Have you ever breastfed?

○ Yes, it was easy ○ Yes, but it was difficult ○ No ○ Other (please specify)

* 91. In any of your pregnancies, did you experience pregnancy related morning sickness (nausea and/or vomiting)?

None Mild Moderate Severe Can't remember

* 92. When did you experience morning sickness (select all that apply)?

* 93. Did you require medication to help with your morning sickness?

○ Yes ○ No

These questions relate to any pregnancy related symptoms you may have experienced in any of your pregnancies.

* 94. Have you experienced pregnancy related constipation?

Yes, severely Yes, moderately Yes, mildly No Can't remember

* 95. Have you experienced pregnancy related diarrhoea?

Yes, severely Yes, moderately Yes, mildly No Can't remember

* 96. Have you experienced pregnancy related headaches?

Yes, severely Yes, moderately Yes, mildly No Can't remember

* 97. Have you experienced pregnancy related migraines?

Yes, severely Yes, moderately Yes, mildly No Can't remember

* 98. While pregnant, did you experience anxiety and/or depression?

Yes, severely Yes, moderately Yes, mildly No Can't remember

* 99. What treatments do you use for your pregnancy/pregnancies?

Emotions and mental health

Please select the most correct response for each emotion.

* 100. Please indicate the common emotions you have experienced in the past year:

	Never	Occasionally	Often	All the time
Happiness				
Sadness				
Depression				
Grief and/or sorrow				
Fear, worry and/or anxiety				
Anger, frustration and/or irritability				
Excessive thinking and/or churning thoughts				

Further interview research may be undertaken at a later date, exploring how issues of digestion and menstruation relate to fertility and pregnancy. This interview would expand on how you responded to the questions above. Please let us know if you would be interested in participating in this future study.

* 101. Would you consider being part of further interview research about your case?

○ Yes ○ No ○ Unsure ○ I've already given my details

Thank you so much for taking the time to complete our survey. Please share the survey link with your family, friends, and anyone who may be interested in contributing to the study of women's health:

https://www.surveymonkey.com/r/WSUwomenshealthsurvey

For more information about this study, please contact Teja at T.Jaensch@westernsydney.edu.au

The results of our current study should be completed by June 2016.

Thank you for your time!