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# Evaluating web-based pelvic floor muscle education for pregnant women

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Evaluating Web-Based Pelvic Floor Muscle Education for Pregnant Women

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| | |
|---|---|
| ANE | Antenatal Education |
| ASE | Attitude-Social influence-self-Efficacy |
| BMI | Body Mass Index |
| CONSORT | Consolidated Standards of Reporting Trials |
| DOH | Department of Health |
| HBM | Health Belief Model |
| IBM-SPSS | The Statistical Package for Social Sciences, v. 22 |
| IRSAD | Index of Relative Socio-economic Advantage and Disadvantage |
| LOTE | Languages other than English |
| LUSCS | Lower Uterine Segment Caesarean Section |
| NICE | National Institute for Health and Care Excellence |
| NMHRC | National Health and Medical Research Council |
| NMHS | North Metropolitan Health Service |
| PFM | Pelvic Floor Muscle(s) |
| PFME | Pelvic Floor Muscle Exercise(s) |
| PT | Physiotherapist(s) |
| SCT | Social Cognition Theory |
| SEIFA | Socio-Economic Indexes for Areas |
| SES | Socio-Economic Status (Backgrounds) |
| SMHS | South Metropolitan Health Service |
| SUI | Stress Urinary Incontinence |
| TTM | Transtheoretical Model of Health Behaviour Change |
| UI | Urinary Incontinence |
| WA | Western Australia |

## List of Definitions

Andragogy – “the art and science of helping adults learn” (Merriam & Bierema, 2014, p. 42).

Antenatal:  Occurring prior to birth (N Dorland, 2007).

Antenatal Education Classes:  education that pregnant women receive in a hospital-based class setting facilitated by a midwife, physiotherapist or other health educators. Antenatal education classes are also termed “Childbirth and early parenting education is an integral component of maternity and child and family health care, the underpinning philosophy being that pregnancy, birth and early parenting are normal and significant life events for most women and their families”.  The classes are “based on an understanding and application of adult learning and group facilitation” (Svensson et al., 2011, p. 6).

Antenatal Care:  Primary health care which includes health promotion and illness prevention during pregnancy that has the potential to influence the health and wellbeing of the woman, her immediate family and future generations (Svensson et al., 2011, p. p. 6).  “Antenatal care is the care you receive from healthcare professionals during your pregnancy.  “The purpose of antenatal care is to monitor your health, your baby’s health and support you to make plans which are right for you” (National Health Service, 2014).

Body Mass Index:  A measurement that has replaced weight as the preferred determinant of obesity.  The body mass index is calculated as a person's weight in kilograms divided by the square of the person's height in meters (Centres for Disease Control and Prevention, 2014).

Continence and Women’s Health Physiotherapist:  A physiotherapist who has undertaken additional training and “specialises” in assessing and treating pregnancy-related issues including pelvic floor muscle dysfunction (Mantle, 2005).  These physiotherapists are not necessarily registered with the Australian Physiotherapy

Association as a "specialist" Continence and Women's Health Physiotherapist (Australian Physiotherapy Association, 2014).

Delivery: Birth of a baby as titled in current research articles (Chiarelli & Cockburn, 2002; Dolan, Hosker, Mallett, Allen, & Smith, 2003; Gillard & Shamley, 2010) unless stated otherwise.

Health Belief: "the personal convictions that influence health behaviors" from the Nursing Outcomes Classification (Farlex, 2012).

The Health Belief Model: Psychological health behaviour change model developed to explain and predict health-related behaviours, particularly in regard to the uptake of health services (Janz & Becker, 1984).

Health: Describes the state of physical, mental and social well-being (Ustun & Jakob, 2005).

Health Education: A consciously constructed opportunity for learning involving communication designed to improve health literacy, improve knowledge and develop life skills which are conducive to individual and community health (World Health Organisation, 1998).

Mixed Methods Research: "Research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study" (Policy statement from the Journal of Mixed Methods Research).

Multipara (plural - multiparae): A woman who has had more than one pregnancy resulting in viable foetuses (Oxford Dictionaries, 2014).

Nulliparous: Women who have not given birth to a baby (N Dorland, 2007).

Parous: Women who have given birth to one or more babies (N. W. Dorland, 2007a).

Pelvic Floor Muscle Dysfunction: Incontinence and prolapse are symptoms of pelvic floor muscle dysfunction (Haylen et al., 2010).
Pelvic Floor Muscle Exercise (or training): "Repetitive selective voluntary contraction and relaxation of specific pelvic floor muscles" (Abrams et al., 2002, p. 1640).

Perinatal Period: "Period of time covering pregnancy and the first year after birth. Includes physical changes, transition and adjustment to parenthood of parents or care-givers, changes in relationships with partner and other family" (Svensson et al., 2011, p. 25).

Postnatal: Occurring after birth, especially the period immediately after birth (N. W. Dorland, 2007b).

Primipara (plural – primiparae): A woman who will be going to give birth for the first time (Lee & Shorten, 1999).

Socio-Economic Indexes for Areas (SEIFA): Ranks the geographical areas according to the socio-economic disadvantage or advantage (Pink, 2013).

Urinary Incontinence: The "complaint of any involuntary leakage of urine" (Abrams et al., 2010, p. 213).

Mixed Urinary Incontinence: "The complaint of involuntary leakage associated with urgency and also with effort, exertion, sneezing and coughing" (Abrams et al., 2010, p. 213).

Stress Urinary Incontinence: "The complaint of involuntary leakage on effort or exertion, or on sneezing or coughing" (Abrams et al., 2010, p. 213).

Urgency Urinary Incontinence: "The complaint of involuntary leakage accompanied by or immediately preceded by urgency" (Abrams et al., 2010, p. 213).

Usual antenatal care: During pregnancy consists of attending antenatal appointments with health workers such as doctors, midwives, ultrasonographers and PT; ANE classes; exercise classes; reading books; searching online; and asking family and friends for pregnancy-related information (Fordyce, 2005).

## Abstract

### Background:

Guidelines recommend that when pregnant women attend antenatal education they gain adequate knowledge about pregnancy-related topics, including the function of pelvic floor muscles and how to undertake a pelvic floor muscle exercise programme. Evidence is limited about how this information can be optimally delivered to pregnant women such that they gain knowledge, confidence and motivation to engage in a pelvic floor muscle exercise programme during the antenatal period. The primary objectives of the research were to evaluate the effect of delivering a web-based pelvic floor muscle education intervention in addition to usual antenatal care on primiparae women's awareness; knowledge; confidence in and beliefs about engaging in and adhering to a pelvic floor muscle exercise programme compared to provision of usual antenatal care alone. Secondary objectives were to investigate pregnant women's attendance at antenatal education; self-reported urinary incontinence; and usage of the Internet for pregnancy-related information.

### Methods:

The research was conducted in two phases. Phase 1 consisted of surveying and auditing physiotherapists who provided antenatal education at public hospitals in 2012 in Western Australia. Phase 2 surveyed pregnant women about their knowledge; confidence in and beliefs about pelvic floor muscle function and exercises; attendance at antenatal education; self-reported urinary incontinence; and usage of the Internet for pregnancy-related information. Subsequently in Phase 2, a pilot randomised controlled trial of primiparae women was conducted to evaluate the effect of providing a novel web-based pelvic floor muscle education programme delivered in addition to usual antenatal care on knowledge, confidence in and beliefs about engaging in and adhering to a pelvic floor muscle exercise programme.

### Results:

Antenatal education facilitated by physiotherapists (n=31) was provided at 25 (83.3%) hospitals. While all classes provided information about pelvic floor muscle function, there was a wide variation in pelvic floor muscle exercise prescription. Of the pregnant women surveyed (n = 633), English speaking respondents (82%) were significantly more knowledgeable about pelvic floor muscles; significantly more likely to practise pelvic floor muscle exercises; significantly more likely to attend antenatal education compared to respondents who spoke languages other than English (18%). A total of 49% of respondents reported urinary incontinence. Fewer than 50% of primiparae women in Western Australia attended antenatal education.

Participants (n=70) enrolled in the RCT were randomised into two groups. There were 47 (67.1 %) participants who provided full follow-up data (n = 25 intervention; n = 22 control). Participants in the intervention group had significantly increased knowledge about pelvic floor muscles and significantly increased belief about engaging in pelvic floor muscle exercises at follow-up compared to the control group. Intervention group participants also showed significantly increased adherence to a pelvic floor muscle exercise programme compared to the control group [Odds ratio 19.1; 95% Confidence Interval (1.8, 196), *p* =.013].

**Conclusions:**
Surveying physiotherapists and pregnant women identified that large numbers of primiparae women do not attend antenatal education. Furthermore, these women reported low levels of engagement in pelvic floor muscle exercises and a high frequency of urinary incontinence. Providing web-based antenatal education was a feasible and effective method of increasing knowledge, confidence in and adherence to pelvic floor muscle exercises. Future research should evaluate this promising intervention as a means of providing more pregnant women with education about pelvic floor muscles and pelvic floor muscle exercises.

**Key words:** antenatal; education; pelvic floor muscle; physiotherapy; pregnancy; urinary incontinence.

## Declaration by Author

This thesis is composed of my original work and contains no material previously published or written by another person except where due reference has been made in the text.  I have clearly stated the contribution by others to jointly authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical design, survey design, design of the intervention, data analysis, professional editorial advice and any other original research work used in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my research higher degree candidature and does not include a substantial part of work that has been submitted to qualify for the award of any other degree, diploma in any university or other tertiary institution.  I have clearly stated which parts of my thesis, if any, have been submitted for another award.

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| Judy Wilson | Signature: |
| PhD | Date: |

**Statement of Contribution to Jointly Authored Works Contained in this Thesis**

Wilson, J., Berlach, R. G., & Hill, A-M. (2014). An audit of antenatal education facilitated by physiotherapists in Western Australian public hospitals. *Australian and New Zealand Continence Journal, 20*(2), 44-51.

Judy Wilson and a colleague, Veronica Major, were principally responsible for the audit conception. Judy Wilson and Anne-Marie Hill were responsible for the design of the survey. The interpretation of data, analysis, drafting and critical revision of the manuscript were undertaken by Judy Wilson, Richard G Berlach and Anne-Marie Hill.

**Statement of Contribution by Others to the Thesis as a Whole**

Associate Professor Anne-Marie Hill was the principal supervisor who provided major guidance and input into the research for this thesis. Phase 2, including the pilot randomised controlled trial was conceptualised by Associate Professor Anne-Marie Hill and she also assisted with the data analysis and scrutinising the first draft of the chapters and the final document.

Adjunct Professor Richard G Berlach was the associate supervisor who very promptly responded to "calls for help" and offered his expertise on the educational and behavioural background of the research. He also assisted with the structure, data analysis and editing of the thesis.

**Statement of Parts of the Thesis that were Submitted to Qualify for the Award of Another Degree**

None.

**Published Work by the Author Incorporated into this Thesis**

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An audit of antenatal education facilitated by physiotherapists in Western Australia

IMPACT Conference, Perth, 2014

Wilson, J., Berlach, R. G., & Hill, A-M.

Can pregnant women gain awareness and knowledge of the function of pelvic floor muscles and pelvic floor muscle exercises through participating in a web-based education programme?

Department of Health Western Australia, October, 2014

Wilson, J., Berlach, R. G., & Hill, A-M.

Preliminary results of the research - evaluating web-based pelvic floor muscle exercises (pilot randomised controlled trial) and The PhD Journey

Institute of Health Research, The University of Notre Dame, 2014

Wilson, J., Berlach, R. G., & Hill, A-M.

Preliminary results of the research - evaluating web-based pelvic floor muscle exercises (pilot randomised controlled trial)

Department of Health Western Australia, December, 2014

Wilson, J., Berlach, R. G., & Hill, A-M.

Preliminary results of the research - evaluating web-based pelvic floor muscle exercises (pilot randomised controlled trial) and The PhD Journey

**Print and Electronic Poster Presentations**

Continence Foundation of Australia Conference, Perth, 2013

Wilson, J., Berlach, R. G., & Hill, A-M.

An audit of antenatal education facilitated by physiotherapists in Western Australia

Australian Physiotherapy Association Conference, Melbourne, 2013
Wilson, J., Berlach, R. G., & Hill, A-M.
An audit of antenatal education facilitated by physiotherapists in Western Australia

Institute of Health Research (Aspire), The University of Notre Dame, 2013
Wilson, J., Berlach, R. G., & Hill, A-M.
An audit of antenatal education facilitated by physiotherapists in Western Australia

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# CHAPTER 1

# Introduction

## 1.10 Background and Context

Births have increased in Western Australia (WA) with 31,734 in 2011 (Hutchinson & Joyce, 2014) compared to 30,843 births in 2010 (Joyce & Hutchinson, 2012). Women who are pregnant or who have delivered a baby are at higher risk of developing undertake a pelvic floor muscle exercise (PFME) programme to maintain or improve pelvic floor muscle (PFM) dysfunction and urinary incontinence (UI) during the perinatal period and later in life than women who have not delivered a baby (Viktrup, Rortveit, & Lose, 2006).

Findings at the fourth International Consultation on Incontinence reported that during pregnancy the prevalence of UI ranges between 32% and 64% (Buckley & Lapitan, 2010). Research conducted in Scotland found the prevalence of UI during pregnancy to be as high as 54.3% (Whitford, Alder, & Jones, 2007a). The costs associated with UI to the Australian health services in 2008 and 2009 were $201.6 million (Australian Government, 2012), and these costs did not include the purchase of continence aids and the costs of UI attributed to people in residential aged care.

Recommendations are that pregnant women attend antenatal education (ANE) and as part of ANE learn how to PFM function aimed to reduce or prevent UI (Abrams et al., 2010; Banta, 2003; Boyle, Hay-Smith, Cody, & Morkved, 2012; Freeman & Monga, 2009). Although many cases of antenatal UI resolve spontaneously post-natally, (Mattea, Cacciatore, Giordano, & La Rosa, 2010) PFME are the recommended non-surgical treatment option for UI.

Physiotherapists (PT) provide education on physiotherapy-related topics at ANE which includes education on the function and facilitation of PFM (Hay-Smith, 2013; Wilson, Berlach, & Hill, 2014). In 2010, involvement of PT at ANE in some Department of Health (DOH) settings was threatened due to budget cuts and since the commencement of this research physiotherapy involvement in ANE in the South West Region of WA has been ceased. Accordingly, it was considered important to investigate other viable means of providing education on PFM and PFME during the antenatal period.

### 1.11 Significance.

Midwives, PT and other health care professionals who provide care for pregnant women are in key positions to offer education aimed at maintaining and improving PFM function and thus reduce PFM dysfunction and its associated problems. The dysfunction of PFM and the possible complication of ensuing UI have been shown to be associated with reduced quality of life and substantial personal and societal costs and increased costs to health services. The challenge of encouraging women to attend ANE (Fabian, Radestad, & Waldenstrom, 2005; Nolan, 2009) and subsequently to undertake and adhere to a PFME programme (Alewijnse, Mesters, Metsemakers, & van den Borne, 2007; Alewijnse, Mesters, Metsemakers, van den Borne, & van den Borne, 2001; Alewijnse, Metsemakers, Mesters, & van den Borne, 2003; Morkved, 2007) has been recognised.

This researcher developed a novel web-based PFM education programme which was designed to address the gaps identified by the research conducted to date in the area of PFM education. The education was evaluated through a pilot randomised controlled trial (RCT). The findings of this research investigating web-based PFM education have implications for pregnant women who are unable to attend ANE, such as women living in rural areas, and pregnant women who speak languages other than English (LOTE) who would be able to view the education with sub-titles. The findings are relevant for health professionals who deliver PFM education and also have the potential to improve the quality of life for women and to reduce health care costs associated with PFM dysfunction.

### 1.20 Organisation of Thesis

This thesis contains a literature review which critically analyses and synthesises the literature pertaining to ANE and specifically PFME. The thesis also presents a description of the research environment used to conduct the research, the results of the two phases of research and a synthesis of the results of the present research. Each chapter is divided into sections pertaining to a main topic.

Chapter 1 provides the introduction, background, purpose, and significance of the study. A critical review of the relevant literature is described in Chapter 2. The final section of literature reviewed discussed web-based education which provided the format for the intervention evaluated in this research. The gaps in the research, theoretical perspectives behind the research, the research questions and aims of the research are described at the conclusion of Chapter 2.

Chapter 3 describes the ethical considerations and the general methods for the research. It includes a description of the novel intervention that was designed and developed by the researcher and subsequently evaluated during Phase 2 (Study 2) of the research.

Chapter 4 presents Phase 1 of the research which reports the background, methods and results for an audit of ANE facilitated by PT that was conducted in Western Australian public hospitals. Chapter 4 is based on a published article (Wilson et al., 2014).

Chapters 5 and 6 describe Phase 2 (Studies 1 and 2) of the research. Chapter 5 describes Study 1 which includes the methods for the evaluation of pregnant women's awareness, knowledge and beliefs on PFM and ANE; self-reported UI; and usage of the Internet in WA to seek out pregnancy-related topics. The results of the survey undertaken in Study 1 are presented and discussed and the implications for future practice are summarised.

Chapter 6 presents Study 2 and describes the methodology relevant to the pilot RCT which evaluated the effect of delivering a web-based PFM education programme in addition to usual antenatal care on pregnant women's awareness, knowledge, confidence in, belief about and adherence to PFME compared to providing usual antenatal care alone. The results of the trial are presented and discussed and implications for practice are summarised.

Chapter 7 synthesises the results of both phases of the research, including the strengths and limitations of the research. The conclusions drawn from the research including the implications for future research and recommendations for health workers involved in antenatal care are presented.

# CHAPTER 2
# Review of the Literature

## 2.10 Scope of the Review

This literature review is a narrative review and synthesises the literature related to physiotherapy-based issues and specifically PFM and PFME during pregnancy. The gaps in the research findings are identified throughout this chapter.

The literature review will briefly summarise the characteristics of the pregnant population and describe physiological changes that occur during pregnancy including the effects of hormones and mode of delivery on PFM in pregnant women. Antenatal education classes are offered to pregnant women as a method of informing women, and their partners, about many aspects of pregnancy. Pregnant women are encouraged to attend ANE (Banta, 2003) which typically includes information on the function and facilitation of the PFM along with exposure to other relevant pregnancy-related information. Traditionally ANE has been facilitated by midwives and PT with the PT delivering the information on PFM and explaining the importance of undertaking a PFME programme (Hay-Smith, 2013; Wilson et al., 2014). Guidelines recommend that all pregnant women undertake a PFME programme (Abrams et al., 2010; Boyle et al., 2012; Freeman & Monga, 2009). This review will discuss the strong evidence for the role of PT during the antenatal period in teaching PFME.

Although the health problem of UI is not the primary focus of this thesis UI may occur when PFM are not functioning optimally. Dysfunction of the PFM causing UI during the perinatal period may be ongoing or recur later in life (Viktrup et al., 2006) especially during menopause. As such the prevalence and costs of UI are also briefly summarised to highlight the costs of PFM dysfunction. This will include the health (both short and long term) and personal costs to women and the broad economic costs to health systems involved in the treatment of UI. The scope of this review will not cover research related to the surgical treatment of UI, PFM training and incontinence in populations of children and men. Other issues related to PFM dysfunction such as faecal incontinence and prolapse which are more likely to occur postnatally and sexual issues which may not be related to pregnancy are not discussed.

### 2.11 Physiology of pregnancy.

Pregnancy is a stage of life when the female body undergoes many physiological and physical changes. This section will discuss the changes relevant to the effects they have on the lower urinary tract and the PFM which may lead to PFM dysfunction causing UI (Haslam, 2005b). The recommended non-surgical treatment for UI is a PFME programme to strengthen and improve the function of the PFM to reduce and prevent UI (Abrams et al., 2010; Boyle et al., 2012; Freeman & Monga, 2009).

The key changes that occur in the woman's body during pregnancy are increased hormone levels, such as oestrogen, progesterone and relaxin, increased total blood volume, enlargement of the uterus and increased body weight (Gould, 2006; Haslam, 2005b). The average weight gain during pregnancy is 11 to 14 kilograms with the largest gain in the third trimester. This weight gain causes increased pressure on the bladder and bowel and may increase the frequency of urination and alter defaecation patterns (Gould, 2006).

The hormones responsible for the changes in the PFM are relaxin, progesterone and oestrogen, which affect the pregnant woman's physiology and physical well-being (Haslam, 2005b). The effects that progesterone, oestrogen and relaxin have on a woman's body during pregnancy are uncertain but thought that the hormonal changes and the associated weight gains contribute to SUI (Kristiansson, Samuelsson, von Schoultz, & Sva rdsudd, 2001).

The levels of relaxin are highest in the third trimester. Relaxin reduces the strength of the connective tissue (Craven, 2005; Ireland & Ott, 2000) and affects relaxation of the PFM (Haslam, 2005b) can contribute to UI in pregnancy (Kristiansson et al., 2001) compounded by the prolonged pressure of the growing foetus on the PFM which may lead to PFM dysfunction (MacLennan, Taylor, Wilson, & Wilson, 2000). There may be a loss of pelvic stability due to the postural changes which occur with weight gain and the increased laxity of the pelvic joints as the levels of relaxin increase (Craven, 2005). These changes can cause low back pain, particularly if the abdominal and PFM are weak (Gould, 2006) due to joint laxity and the development of pelvic girdle pain and increased lumbar lordosis (Heckman & Sassard, 1994). Pelvic girdle pain has been linked to tenderness in the deep PFM muscles in pregnancy (Fitzgerald & Mallinson, 2012) People with low back pain have decreased PFM function compared to people without low back pain (Arab, Behbahani, Lorestani, & Azaari, 2010) although combining PFME with standard treatment for low back pain did not improve the outcomes for improving low back pain in non-pregnant subjects (Mohseni-Bandpei, Rahmani, Behtash, & Karimloo, 2011).

Progesterone levels increase during pregnancy and are essential for the maintenance of pregnancy (Craven, 2005). Progesterone also reduces the tone of the smooth muscle including the detrusor muscle, the supportive ligaments, urethral tone and fascia of the urethra and the PFM may become more lax and elastic (Haslam, 2005b). The bladder also changes position and becomes an intra-abdominal organ. The reduced muscle tone combined with increased urinary output for waste disposal from the foetus may lead to increased frequency of voiding and SUI (Gould, 2006; Haslam, 2005b).

Most of the increase in weight during pregnancy is caused by the growing foetus, increased blood volume and fluid retention (Ireland & Ott, 2000). An increase in body mass index (BMI) as the foetus develops causes an increase in the intra-abdominal pressure which increases the pressure on the bladder and PFM. The increased BMI and increase in the intra-abdominal pressure can also increase the risk of developing SUI (Haslam, 2005b). If SUI is precipitated during the first pregnancy, there is double the chance of having SUI 15 years later in life (Dolan et al., 2003).

### 2.12 The anatomy and function of the pelvic floor muscles.

The anatomy and function of the PFM which form the floor of the pelvis must be discussed with reference to the abdominal muscles as these form part of the structure of the walls of the abdominal cavity. The scope of this thesis is to investigate how to develop awareness, knowledge and encourage optimal function of PFM during the antenatal period.

The bony pelvis provides protection and support for the PFM, pelvic organs and trunk (Haslam, 2005a). "The term pelvic floor relates to the compound structure, which closes the bony pelvic outlet" and "refers to the muscular layer of the pelvic floor" shown in Figure 2.1 (Messelink et al., 2005, p. 375). The floor of the pelvis is comprised of muscle, ligaments and fascia which are in layers. The deepest layer is the endopelvic fascia which is a fibrous layer of connective tissue that surrounds the vagina and attaches to the arcus tendineus laterally. The arcus tendineus attaches to the ischeal spine posteriorly and the anterior pubic bone (Haslam, 2005a). The layer superficial to the endopelvic fascia is the levator ani which is the anatomical nomenclature for the PFM. For ease of reference the term PFM will be used throughout this thesis. The pelvic floor musculature consists of the superficial layer of perineal muscles and the deeper layer of levator ani and coccygeus muscles (iliococcygeus, pubococcygeus and puborectalis muscles) (Ashton-Miller & DeLancey, 2007b). These muscles surround the urethra, vagina and rectum (Herschorn, 2004). Together, the PFM and the endopelvic fascia are known as the pelvic diaphragm (Ashton-Miller & DeLancey, 2007a).

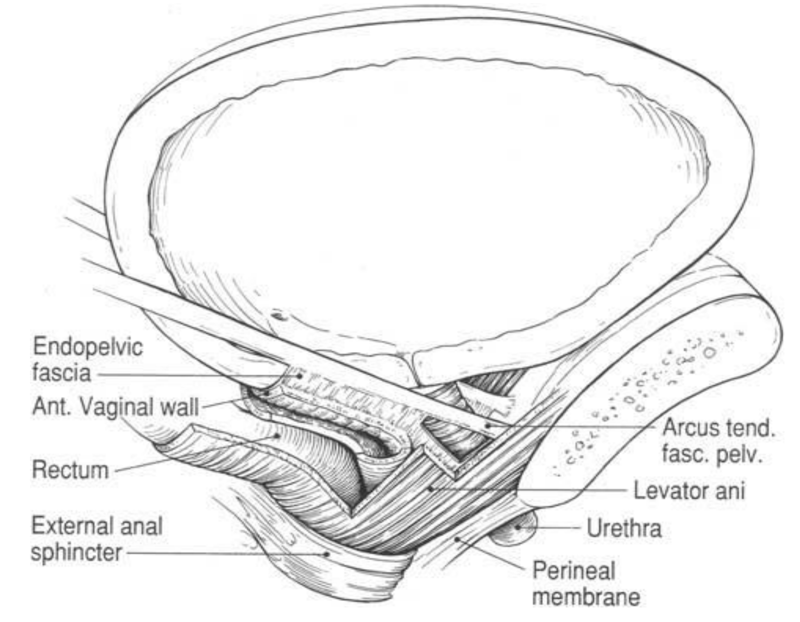



*Figure 2.1.* "Lateral view of the components of the urethral support system. The levator ani muscles support the rectum, vagina, and urethrovesical neck. The endopelvic fascia beside the urethra attaches to the levator ani muscle; contraction of the levator muscle leads to elevation of the urethrovesical neck. Puborectalis muscle is removed for clarity" (From DeLancey 2005, redrawn from Delancy 1994 with permission of C.V. Mosby Company, St. Louis). Adapted with permission from Ashton-Miller, J., & DeLancey, J. (2007). Functional anatomy of the female pelvic floor. *Annals of New York Academy of Sciences Journal, 1101*, 266-296. doi: 10.1196/annals.1389.034.

There is controversy about the exact innervation of the PFM but it is accepted that they are supplied by branches from the sacral plexus. The nerves may originate from the sacral spinal segments three to five (Vodusek, 2007) or the third and fourth branches of the sacral nerves to form the pudendal nerve which supplies the PFM (Herschorn, 2004). The pudendal nerve also supplies the urinary and anal sphincters (Vodusek, 2007). Pelvic floor muscle exercise or training relies on sufficient enervation of the PFM (Ashton-Miller, Howard, & DeLancey, 2001).

There are numerous roles of the PFM. The roles of the PFM are maintenance of urinary continence; faecal continence; support the pelvic organs; prevention of pelvic organ prolapse (Ashton-Miller & DeLancey, 2007a); supports the lumbopelvic area

(Neumann & Gill, 2002; Richardson, Hodges, & Hides, 2004; Sapsford, 2004); particularly during increased intra-abdominal pressure which is associated with activities of daily living, such as coughing and lifting (Ashton-Miller & DeLancey, 2007a); and have a role in sexual function (Handa, Cundiff, Chang, & Helzlsouer, 2008). This thesis investigates education aimed at maintaining optimal function of the PFM, primarily related to their role in preventing UI during the antenatal period, and although the other functions are synonymous with maintenance of PFM, they will not be reviewed in the scope of this thesis because they require individual investigation. Continence is reliant on the bony pelvis and the PFM functioning correctly (Herschorn, 2004). Correctly functioning PFM "can voluntarily and involuntarily contract and relax" (Haylen et al., 2010, p. 11). The correct facilitation of the PFM causes compression of the mid urethra, vagina and rectum against the pubic bone (Ashton-Miller & DeLancey, 2007a) to maintain continence (Ashton-Miller & DeLancey, 2007b; Herschorn, 2004; Messelink et al., 2005).

During a vaginal delivery computer modelling demonstrates that the PFM tissues are stretched to ratios greater than three times normal anatomical size (Ashton-Miller & DeLancey, 2007a) and damage to the muscles may also include damage to the perineal nerve (Kearney, Miller, Ashton-Miller, & DeLancey, 2006) and cause SUI during the postnatal period (Dietz & Lanzarone, 2005). Therefore, in summary, interventions such as PFME programmes that can provide education on PFM aimed to maintain and improve PFM function in the antenatal period, may potentially reduce and prevent SUI in the postnatal period (Lemos, de Souza, Ferreira, Figueiroa, & Cabral-Filho, 2008). Pelvic floor muscle dysfunction will be discussed further in Section 2.40.

### 2.13 A brief anatomy of the abdominal and respiratory muscles.

The abdominal cavity is surrounded by muscles shown in Figure 2.2, which are considered to work in synergy rather than isolation (Sapsford, 2004; Sapsford et al., 2001; Talasz, Kofler, Kalchschmid, Pretterklieber, & Lechleitner, 2010). The abdominal muscles form the anterior and lateral walls of the abdominal cavity. The muscles consist of the transversus abdominis, internal and external oblique muscles and anteriorly the rectus abdominis muscles. The transversus abdominis is the deepest of the abdominal muscles. The transversus abdominis and oblique muscles are innervated by the seventh to twelfth thoracic nerves and the iliohypogastric and ilioinguinal nerves. The recti are innervated by the seventh to twelfth thoracic nerves (Haslam, 2005a).

The diaphragm is the respiratory muscle that forms the superior border of the abdominal cavity as demonstrated in Figure 2.2. Respiration is a normal, continuous and involuntary process and the rate and depth of respiration varies proportionally to bodily functions such as pregnancy and exercise (Barton, 2005a). Figure 2.3 shows the synergistic movements of the diaphragm in relation to changes in intra-abdominal pressure and the effect breathing has on PFM (Sapsford, 2004; Sapsford et al., 2001; Talasz et al., 2010). This is important because when a pregnant women undertakes a PFME programme then the recommendations are that she continues to breathe normally as it is more difficult to elevate the PFM if an individual is taking a deep breath and the diaphragm is descending which exerts increased pressure onto the PFM (Sapsford, 2004; Sapsford & Hodges, 2001).

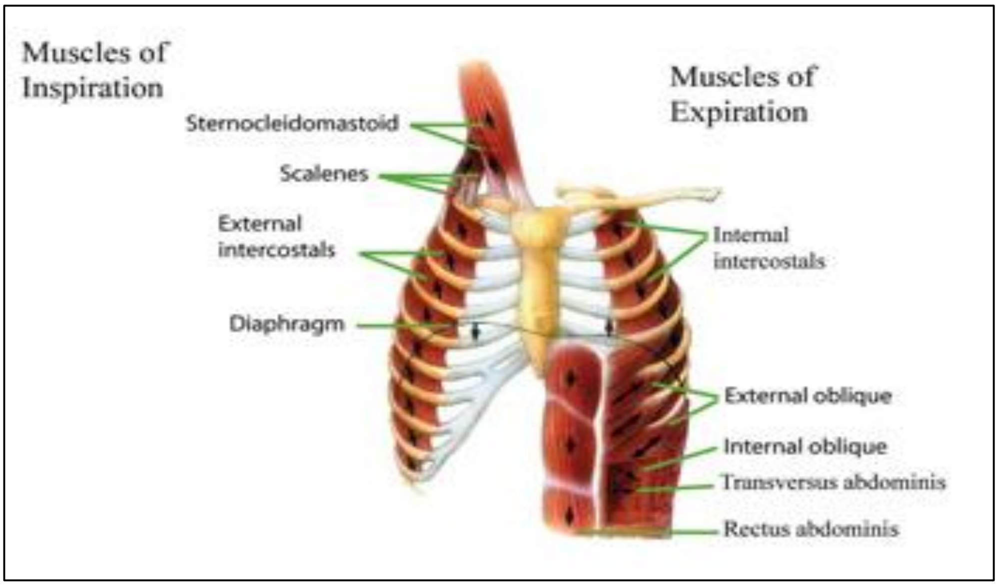
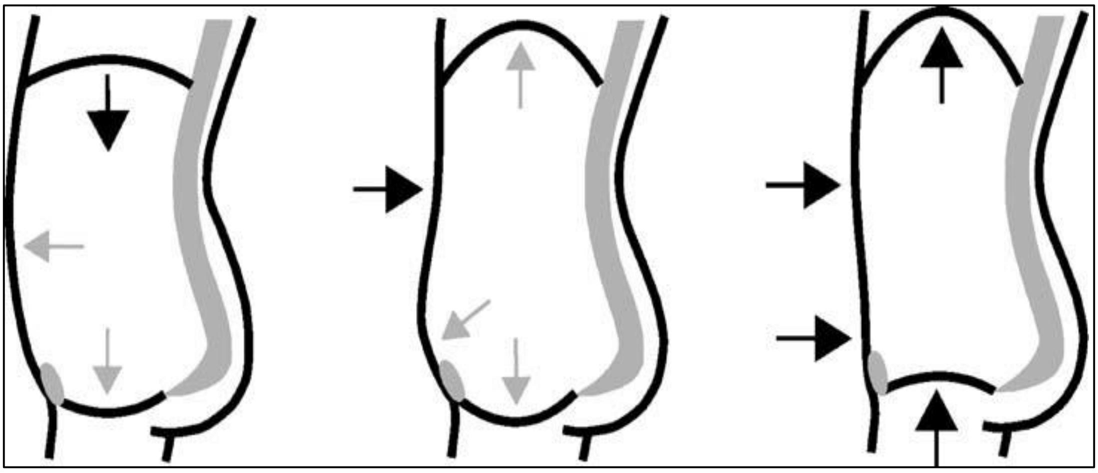



*Figure 2.2.* View of the respiratory and abdominal muscles of rectus abdominis, transversus abdominis and oblique muscles (J. E. Hall, 2011).



1. 2. 3.

*Figure 2.3.* Theoretical model demonstrating the movements of the abdominal cavity muscles during normal respiration (Diagrams 1 and 3). Superiorly is the diaphragm, anteriorly the abdominal muscles and inferiorly are the pelvic floor muscles. Diagram 2 shows descent of the pelvic floor muscles with forced expiration. Adapted with permission Talasz, H., Kofler, M., Kalchschmid, E., Pretterklieber, M., & Lechleitner, M. (2010). Breathing with the pelvic floor? Correlation of pelvic floor muscle function and expiratory flows in healthy young nulliparous women. *International Urogynecology Journal, 21*(4), 475-481. doi: 10.1007/s00192-009-1060-1.

### 2.14 Stakeholders involved in research and recommendations for pregnant women.

This section gives a brief overview of some of the stakeholders involved in the research and clinical delivery of ANE and treatment for UI. These organisations review the research findings, organise conferences and provide guidelines on interventions related to ANE, PFM and continence. The guidelines provided by the stakeholders are discussed and used in the present research.

The International Continence Society comprises of members from 64 countries, from many health disciplines, and provides guidelines on the maintenance of continence. An aim of the International Continence Society is “to be a single point of access for the key professional standards and terminology relevant to all health professionals dealing with urinary and faecal continence” (International Continence Society, 2013). The International Continence Society terminologies are referenced throughout this thesis in order to help ensure consistency in definition between researchers and clinicians. The International Continence Society also systematically reviews the assessment, diagnosis, management and research of lower urinary tract dysfunction (Dietz & Lanzarone, 2005).

An International Consultation on Incontinence – Research Committee was formed in 2008 from discussion at the time of the 4th International Consultation on Incontinence (Paris, July 2008), which highlighted the need for a forum of active experts to discuss research on continence. The International Consultation on Incontinence - Research Committee is supported by the World Health Organisation. The committee evaluates the treatments and costs of UI and makes recommendations for best practice based on the research. Statistics from the International Consultation on Incontinence - Research Committee, are able to inform and guide research and these data have been incorporated into this thesis.

The National Institute for Health and Care Excellence (NICE) is a British organisation which provides independent evidence-based guidance to organisations involved in health care. This includes guidelines related to the care of pregnant women including recommendations on PFM education and exercises (NICE, 2013a). In 2013, NICE issued new guidelines for prevention and treatment of UI with amendments which were designed to complement, but not to replace, the 2006 guidelines (NICE, 2013b) hence, during the present research, the 2006 guidelines are referenced.

In Australia The Australian Government Department of Health and Aging recently released draft guidelines on care for pregnant women (Australian Government Department of Health and Ageing, 2012, 2013). These guidelines were thorough with regard to medical and nursing care, for example, testing for vitamin D levels and ultrasound scans but did not provide guidelines on education relating to PFM or treatment for UI. Results from the present research may inform future guidelines from the Department of Health and Aging whereby information on UI and recommendations for teaching PFME can be included in the guidelines.

Consequently, the NICE guidelines are referred to instead throughout the present research.

The Australian Physiotherapy Association (APA) is a national body which provides resources, advocacy and careers advice to all physiotherapists who are members. The APA has a Women's Health Special Interest group which provides education (Australian Physiotherapy Association, 2014).

The Continence Foundation of Australia provides free current information for professionals and the public. The information includes where to seek help, funding and the latest research (Continence Foundation of Australia, 2012b).

The National Association for Childbirth Educators Incorporated in Australia is a private body and reports on competency standards for childbirth educators (Svensson et al., 2011). The latest document reported on the skills and communication standards for people who facilitate education for pregnant women but did not give recommendations on educational topics. Definitions used by National Association for Childbirth Educators Incorporated in their report and relevant to this research have been used as a reference point in the present research.

The DOHWA is the public health system of WA (Government of Western Australia Department of Health, 2014b). Their purpose is to assist people living in WA to have healthier, longer and better lives. Employees of the DOHWA who are involved in antenatal care are required to record statistics on the status of pregnant women. The data are analysed and reported upon annually by the DOHWA. Data from the present research are presented and compared to relevant data from DOHWA. However, data on the prevalence of UI in pregnant women in WA are not currently collected by the DOHWA (Hutchinson & Joyce, 2014).

### 2.20 Introduction to Antenatal Education

In Australia and other developed countries, ANE classes delivered by midwives, PT and other health educators are offered to pregnant women as a method of informing women, and their partners, about many aspects of pregnancy. The classes are usually conducted in a hospital-based setting (Svensson et al., 2011; Walker, Visger, & Rossie, 2009).

Published research on ANE has been extensively conducted by midwives but the research often does not focus on outcomes related to physiotherapy topics, such as knowledge of and adherence to a PFME programme. Accordingly, this section critically reviews the current research studies related to providing ANE education for pregnant women and also the extent and findings of physiotherapy research related to ANE. Included will be a review of the evidence for the prescription of PFME and education during pregnancy. Research that has investigated the health behaviour change theories, approaches to the delivery of ANE and PFM education and adherence to a PFME programme are also discussed in the following sections.

### 2.21 Antenatal education.

The purpose of antenatal care and education is the identification and treatment of conditions that affect the health of the foetus and/or the pregnant woman and the quality of life for a new mother (Banta, 2003; Svensson, Barclay, & Cooke, 2007). In countries, such as Australia, UK and USA, women may attend ANE classes as part of antenatal care usually offered in the final weeks of pregnancy, to receive information on pregnancy, labour, delivery and parenting. In less developed continents, such as South Asia and Sub-Saharan Africa, where 99% of maternal deaths occur (World Health Organisation, 2014), women may negotiate pregnancy without having an appointment with a health professional. Physiotherapists provide antenatal care and ANE with the aim of promoting and maintaining optimal physical health during pregnancy (Fordyce, 2005). This care and education includes information on the anatomy and function of the PFM and facilitation of PFME as well as other physiotherapy-related topics (Britnell et al., 2005; Wilson et al., 2014).

There are different models of antenatal care and ANE. Historically, women learnt about labour and parenting from their local communities and extended families and formal ANE classes were not available (Svensson, Barclay, & Cooke, 2006; Walker et al., 2009). A group of researchers has provided a comprehensive synthesis of research on ANE (Svensson, Barclay, & Cooke, 2008). In Australia, early involvement by PT in ANE classes where participants attended in a large group, involved PT as facilitators who taught relaxation techniques (Svensson et al., 2008). In the 1980s in Australia and overseas, midwives became more involved in ANE often teaming up with PT in a dual role as the facilitators. During the 1990s, a review by the DOH (Victoria, New South Wales and WA) found it was common to have 30 to 40 couples attending an ANE class and that the educator controlled the learning opportunities of the large group (Svensson et al., 2008). A review to ascertain the needs of pregnant women (n = 205) (Svensson et al., 2006) found that women reported that ANE programmes should be developed proactively through interviews and groups, not reactively using feedback from surveys. The women also stated that experiential learning, where they experienced the process, was their preferred method of learning.

Later research has demonstrated that ANE is a method of informing prospective parents about pregnancy and caring for a newborn (Svensson, Barclay, & Cooke, 2009). Women reported that social support was an important part of ANE. Prospective parents reported positive effects from meeting other new parents at ANE classes (Fabian et al., 2005; Gagnon & Sandall, 2007; Tighe, 2010). A systematic review of nine RCT of structured ANE programmes relating to pregnancy, birth or parenthood, which included women (n = 2,284) from ten developed countries, including Australia, was undertaken in 2007 (Gagnon & Sandall, 2007). Thirty-seven studies were excluded due mainly to the design not being a RCT and loss to follow-up data. The results from the outcomes of the RCT included in the review showed a lack of high quality evidence with no consistent measurement of outcomes. In summary, at present there appears to be limited published evidence for the effectiveness of ANE classes. There is also scant evidence for the best method of delivering ANE (Gagnon & Sandall, 2007). However, despite the absence of definitive evaluations, experts still recommend attendance at ANE classes for all pregnant women (Banta, 2003).

Even though it is recommended that all women attend ANE (Banta, 2003) some women choose not to attend the classes. A study undertaken in Ireland, investigated the poor attendance at ANE (Tighe, 2010). Sixteen primiparae women, six months postnatally were interviewed via focus groups, to establish their attitudes to ANE. The participants were both attenders and non-attenders at ANE. Emergent themes demonstrated a need for more promotion of ANE and flexible availability of ANE classes. Recommendations were for greater involvement of prospective parents during classes and a move away from didactic teaching with the introduction of the principles of adult learning to facilitate the ANE. Such results support the results discussed earlier, namely that classes ought to be needs-driven by the prospective parents rather than by educators (Svensson et al., 2006; Tighe, 2010).

A small number of studies that have investigated non-attenders at ANE have reported that pregnant women who do not attend ANE have similar socio-economic backgrounds (SES) (Redman, Oak, Booth, Jensen, & Saxton, 1991). One study (n = 2,546) (Fabian, Radestad, & Waldenstrom, 2004), found that 16.5% were non-attenders of ANE. Those who were non-attenders or reported that they found ANE of little assistance were more likely to be from low SES, have a low level of education, smoke and be unemployed (Fabian et al., 2005) Accordingly, these researchers suggested that future research on ANE should focus on forms of education for women of low SES (Fabian et al., 2005). These studies (Fabian et al., 2004, 2005) were undertaken in Sweden and the non-attenders were usually from non-Swedish backgrounds, that is, had Swedish as a second language which is the equivalent of speaking LOTE in Australia. The present research will collect data that describes the population of women who spoke LOTE.

### 2.22 Physiotherapy research related to antenatal education.

Antenatal education facilitated by PT is available in Australia (Svensson et al., 2009). This ANE is a clinical intervention which can be used by Continence and Women's Health PT as a means to educate pregnant women about the structure, function and correct exercising of PFM (Bo, 2007b; Haddow, Watts, & Robertson, 2005; Neumann, Grimmer, Grant, & Gill, 2005b; Price, Dawood, & Jackson, 2010).

There has been limited published research that has specifically investigated ANE undertaken by PT but there are many research studies published that report on PFM function in relation to pregnancy and physiotherapy-related issues during pregnancy, such as back pain and UI (Hay-Smith, 2013; S. L. Wesnes, G. Rortveit, K. Bo, & S. Hunskaar, 2007; Whitford et al., 2007a). The involvement of PT historically stems from the 1930's when "maternity exercises" were introduced at St Thomas' Hospital, London, England (Hay-Smith, 2013, p. 16) and PT would include PFME which were propounded to treat and prevent incontinence, reduce constipation and provide other benefits, which are now considered to lack veracity by today's evidence-based standards. This review focused on considering the "priorities for present-day obstetric physiotherapy" (Hay-Smith, 2013, p. 16), and concluded that the physiotherapy research concentrate on discrete physical physiotherapy-related problems such as teaching PFME as there is evidence for PFME being effective at preventing and treating UI and treating low back and pelvic pain, which are traditionally treated individually (Hay-Smith, 2013). There continues to be a need to promote and educate people about continence, and research recommends that PFM education should be included in ANE programmes (Abrams et al., 2009; Boyle et al., 2012) and evaluated in future research. It has also been recommended that Continence and Women's Health PT teach pregnant and post-partum women intensive PFME (Britnell et al., 2005; Hay-Smith, 2013) and that PT work collaboratively with midwives as there are currently fewer opportunities than previously for PT who specialise in Continence and Women's Health to have contact with pregnant women (Hay-Smith, 2013). As such, further research is required to investigate what role PT as a profession, as opposed to midwives, could have in ANE and to identify areas for improvement in the facilitation of ANE and in particular the role of PFM training by PT during this period.

Research findings indicate that 94% of women experience postnatal co-morbidities including those that can be treated by a Women's Health PT, (Brown & Lumley, 1998; Ireland & Ott, 2000) although a detailed discussion of these co-morbidities apart from UI are beyond the scope of this thesis. Urinary incontinence is one of the most frequent co-morbidities, with studies estimating that between six to 67% of women experience incontinence either during pregnancy or during the postnatal period (Morkved, 2007). The combination of appropriate antenatal information, possibly provided by PT, including the prescription of PFME may assist in decreasing the incidence of UI and may improve the ongoing perinatal health of women (Artal & O'Toole, 2003; Bastani, Hidarnia, Kazemnejad, Vafaei, & Kashanian, 2005; Morkved, Bo, Schei, & Salvesen, 2003). As such, it is important to investigate whether pregnant women have the opportunity and are motivated to take part in ANE. In particular, further research should investigate whether PT are involved in the ANE and if PFM facilitation and function are taught during the education session and by whom, as this may influence the prevalence of postnatal co-morbidities including UI.

**2.30 Grading of Levels of Evidence for Pelvic Floor Muscle Exercises**

The evidence from the research regarding PFME is graded at varying levels, the different stakeholders use alternative grading systems and grading Levels 1 and C are mentioned in the present document. As discussed in the next paragraph there is Level 1 evidence for PFME being a recommended treatment for SUI. Level 1 evidence is a systematic review of RCT as defined by the National Health and Medical Research Council (NMHRC) (Coleman et al., 2009), the International Consultation on Incontinence (Moore & Dumoulin, 2013) and NICE (NICE, 2005). The NHS in the UK uses Grade A (NHS, 2010b) as the term consistent with Level 1 evidence from studies graded by the NMHRC and NICE. Grade B studies are Consistent Retrospective Cohort, Exploratory Cohort, Ecological Study, Outcomes Research, case-control study; or extrapolations from Grade A studies (NHS, 2010b). Level 111 studies (Coleman et al., 2009) are equal to Grade C evidence which is a case-series or extrapolations from level B studies (NHS, 2010b). Evidence graded from A to C provides evidence that can support and guide practice (Australian Government Department of Health and Ageing, 2012).

**2.31 The benefits of pelvic floor muscle exercises.**

As already discussed in Sections 2.11 and 2.12, the type of UI most likely to occur during pregnancy is SUI (Haslam, 2005b) therefore the assumption is made that participants in the present research who have UI will predominately have SUI. There are different types of UI as shown in definitions. Because research articles and the present research are often unable or chose not to distinguish the type of UI affecting participants, the generic term UI is usually used throughout this thesis.

The International Continence Society concluded that there is Grade A evidence for recommending “supervised PFM training, for women with stress incontinence” (Abrams et al., 2010, p. 222). The NICE guidelines agree with the International Continence Society and recommend PFME as the first-line treatment for SUI (National Collaborating Centre for Women's and Children's Health [UK], 2006). A systematic review of the research evaluating the benefits of PFME also concluded that there is strong evidence that the preferred initial conservative treatment for SUI are PFME (Dumoulin & Hay Smith, 2010). Pelvic floor muscle exercises are effective in reducing or preventing SUI (Bo & Talseth, 1996). Pre-contraction of the PFM prior to a rise in intra-abdominal pressure has been shown to reduce or prevent SUI in older women (Miller, Ashton-Miller, & DeLancey, 1998). Learning how to engage in this type of PFME is described as the “knack” (Miller et al., 1998) and consists of facilitating a PFM contraction prior and during tasks of daily living such as coughing, lifting and moving from sitting to standing.

On the weight of available evidence, it is important that pregnant women are taught PFME during the antenatal period. On behalf of NICE, Ismail (2009), undertook an audit of postnatal women (n = 223) in the UK and concluded that although 95% of the women surveyed were aware of PFME, only a minority practised the exercises and had the correct information. The NICE recommended that strategies are needed to improve awareness and adherence to PFME. The NICE recommendations are supported by other researchers who also state there is Grade 1 evidence for education on PFM and training in PFME for all pregnant women to prevent or reduce SUI in the antenatal period (Abrams et al., 2009; Boyle et al., 2012; Hay-Smith et al., 2009; Sahakian & Woodward, 2012). Several studies, discussed in more detail in the following Section 2.32, also concluded that PFME performed during the antenatal period reduced incontinence during pregnancy and postnatally (Morkved et al., 2003; Reilly et al., 2002; Sampselle et al., 1998). Postnatally, research results suggested that the reduction in UI may be as much as 20% if women undertake a PFME programme whilst pregnant (Lemos et al., 2008; Mason, Glenn, Walton, & Hughes, 2001b; Reilly et al., 2002; Sampselle et al., 1998), although a later RCT did not find a significant difference in episodes of UI between the intervention and control groups (Mason, Roe, Wong, Davies, & Bamber, 2010).

Practising PFME during the antenatal period is recommended by NICE to reduce UI postnatally and in the long-term (Freeman & Monga, 2009). Evidence thus supports recommendations that it is important for all pregnant women to have the opportunity to participate in ANE which includes education on the benefits of PFME (Ismail, 2009). Importantly, there is no evidence that PFME during pregnancy can cause any side-effects for the prospective mother or the baby (Salvesen & Morkved, 2004).

### 2.32 Pelvic floor muscle exercise prescription.

According to the International Continence Society, there is Grade C evidence to recommend that PFME "should be a standard component of prenatal and postpartum care and to instruct women who experience incontinence prior to pregnancy" (Abrams et al., 2010, p. 235). The aims of undertaking PFME during pregnancy are to maintain or increase the strength, (Morkved et al., 2003) endurance and co-ordination of the PFM in order to reduce or prevent incontinence (Alewijnse et al., 2007). The effect size of studies varied, with not all interventions resulting in an increase in PFM strength when a PFME programme is undertaken (Reilly et al., 2002; Sampselle et al., 1998), as discussed in the next paragraph. It is also important for women to become aware or increase the awareness of the PFM during pregnancy as developing such awareness is often more difficult after childbirth due to the lack of sensation caused by the trauma of a vaginal delivery (Vodusek, 2007).

A systematic review of three studies, involving primiparae women, investigated PFME to reduce or prevent UI in order to ascertain the optimum prescription of PFME (Morkved, 2007). Table 2.1 shows a summary of the training protocol for the three studies which met the review inclusion criteria. Pelvic floor muscle exercises prescribed varied from one to 12 contractions to 20 to 50 contractions per day (Morkved, 2007) and all studies demonstrated that PFME are effective in reducing UI during pregnancy and in the immediate postnatal period. The training protocol is important because the prescription of PFME recommended in the novel web-based PFM education programme in the present research is based on the training protocol used by the three researchers shown in Table 2.1.

Recent recommendations from the systematic review by Morkved (2007) and national guidelines are that PFME should commence at about 20 weeks' gestation at the level appropriate for the pregnant woman and increase to eight to 12, near maximal contractions, three times per day (Bo, 2007b; National Collaborating Centre for Women's and Children's Health [UK]), 2006 #757} holding each contraction for three to 10 seconds (Bo & Aschehoug, 2007). The researchers also recommended that more high quality trials be conducted to improve the levels of evidence regarding PFME in the antenatal period and whether doing PFME during pregnancy has a long term effect on preventing UI later in life.

Table 2.1.

*Summary of Systematic Review of Studies Investigating Pelvic Floor Muscle Exercises*

| Study | 20 weeks' gestation n | Type of study | Pelvic floor muscle exercise prescription |
|---|---|---|---|
| Morkved et al. (2003) Norway | 289 | 2-arm RCT | 12/52, intensive PFME in group with a home exercise programme (6s x 8) x 2/day VMC |
| Reilly et al. (2002) England | 268 | 2-arm RCT | From 20/40 until delivery intensive PFME (6s x 8) x 2/day and "knack" |
| Sampselle et al. (1998) USA | 72 | 2-arm RCT | 30 PFMC/day, maximum or near VMC, tailored programme |

*Note.* 12/52 = 12 weeks; 20/40 = 20 weeks' gestation; PFMC = pelvic floor muscle contractions; VMC = voluntary maximum contraction. Adapted from Morkved, S. (2007). Evidence for pelvic floor physical therapy for urinary incontinence during pregnancy and after childbirth. In K. Bo, B. Berghmans, S. Morkved & M. Van Kampen (Eds.), *Evidence-based physical therapy for the pelvic floor: Bridging science and clinical practice* (pp. 317-336). Sydney, N.S.W.: Butterworth Heinemann Elsevier.

Studies that have investigated PFME also state that PFME reduce or prevent the symptoms of UI when the exercises are performed correctly (Bo, 2007b; Haddow et al., 2005; Neumann et al., 2005b; Price et al., 2010). This includes the "knack" (Bo, 2007b; Hay-Smith et al., 2009; Miller et al., 1998; Morkved, 2007) or the pre-contraction of the PFM to cough, sneeze and other activities related to increased intra-abdominal pressure. Transversus abdominis has been shown to co-contract with the PFM (Bo, 2007b; Miller, 1996) and PFM may be trained indirectly by the co-contraction of transversus abdominis (Sapsford, 2004) although some studies demonstrate that this effect may be variable (Pereira et al., 2013). Sitting or standing in an upright position is imperative for the pelvic floor and transversus abdominis muscles to co-contract correctly (Sapsford, Richardson, & Stanton, 2006). Optimising the correct contraction of the PFM is another reason why it is preferable for the PFM education to be undertaken by an educator who specialises in Continence and Women's Health.

### 2.33 Frequency of pelvic floor muscle exercise training.

The success of PFME preventing and reducing UI is contingent upon the correct activation of the PFM and PFME being undertaken a minimum of twice per week but preferably daily (Boyle et al., 2012; Chiarelli & Cockburn, 2002; Haddow et al., 2005; Mason et al., 2001b) from 20 weeks' gestation (Morkved, 2007). Chiarelli and Cockburn (2002) only included women in their study who had performed PFME two or more times per week and research investigating the effects of PFME training on UI needs to account for variations in PFME sessions per week as discussed in adherence (Section 2.60). The recommendation that daily PFME be undertaken is supported by further studies which found that women who experience regular supervision of PFME indicated greater improvement in incontinence than those who have little or no supervision (Hay-Smith, Herderschee, Dumoulin, & Herbison, 2011). According to a Cochrane Systematic Review (2012) of women during the perinatal period, higher intensity PFME training is more effective than lower intensity PFME training in reducing SUI. It was estimated that women who received intensive PFME during pregnancy were 56% less likely to report SUI that those who did not receive intensive PFME (Boyle et al., 2012). For non-pregnant women with uncomplicated UI, the International Continence Society recommended that PFME as the "initial treatment should be maintained for eight to 12 weeks before reassessment and specialist referral" (Abrams et al., 2010, p. 222). The NICE was in agreement and recommended first-line treatment of PFME for SUI as a minimum of three months (Freeman & Monga, 2009).

An outcome of a recent literature review was that pregnant women who practised PFME reported fewer symptoms of SUI in the postnatal period (Sahakian &

Woodward, 2012). The reviewer suggested that a high quality RCT be undertaken to further clarify that PFME undertaken in the antenatal period can improve SUI in the postnatal period. Suggested aims of future research were to provide health workers with an improved understanding of PFME and an increased ability to motivate pregnant women to practise PFME (Sahakian & Woodward, 2012). Additionally, alternative means of PFME training could be provided such as online programmes which could offer more women access to experienced health workers in this area such as Women's Health PT, who have high levels of knowledge of PFME and are able to instruct and motivate pregnant women to undertake a PFME programme to maintain or improve PFM function.

## 2.40 Effects of pregnancy and mode of delivery on the pelvic floor muscles.

As discussed in Section 2.11, the PFM stretch and soften, during pregnancy due to hormonal changes. These changes can lead to PFM dysfunction causing SUI, back pain and results in reduced of quality of life for the woman and increased health costs. This section discusses how PFM are affected by the mode of delivery. Information on the prevalence of UI is documented in Section 2.42 and Section 2.43 discusses the physical, social and economic costs of PFM dysfunction in regard to UI.

### 2.41 Pelvic floor muscle function during pregnancy.

The importance of maintaining optimal PFM function during pregnancy is highlighted by research findings which show that the main predisposing factor for developing SUI is delivering a baby (MacLennan et al., 2000; Rortveit, Daltveit, Hannestad, & Hunskaar, 2003). Women who have vaginal deliveries appear to be at higher risk of PFM dysfunction than women who have a lower uterine segment caesarean section (LUSCS) (Rortveit et al., 2003). A large study (Rortveit et al., 2003) of women (n = 15,307) aged less than 65 years, was undertaken in Norway. The study concluded that SUI was significantly associated to the mode of delivery whereas an increased risk of both SUI and mixed UI is associated with childbearing or having been pregnant.

Women who become pregnant are at a higher risk of developing PFM dysfunction than nulliparous women (Hunskaar et al., 2005). Likewise pregnant women, parous women and women who have delivered vaginally have an increased risk of developing PFM dysfunction which may result in SUI and pelvic organ prolapse than women who are nulliparous (Ashton-Miller & DeLancey, 2007a; Handa et al., 2011; Phillips & Monga, 2005). However, the precise mechanism leading to PFM dysfunction during pregnancy and vaginal delivery is unclear (MacLennan et al., 2000; Rortveit et al., 2003). For some women, changes that occur as a result of vaginal delivery can lead to UI, plus or minus faecal incontinence, in the postnatal period or later in life (Ashton-Miller & DeLancey, 2007a; Dolan et al., 2003; Handa et al., 2011; Phillips & Monga, 2005).

Additional risk factors have been found to be associated with the development of PFM dysfunction (Buckley & Lapitan, 2010; Rortveit et al., 2003) which include parity (Chiarelli & Brown, 1999; Phillips & Monga, 2005; S L Wesnes, G Rortveit, K Bo, & S Hunskaar, 2007) and aging (Morkved, 2007). Other factors found to be associated with PFM dysfunction and SUI include weak collagen, constipation, advanced pelvic organ prolapse and chronic obstructive airways disease (Morkved et al., 2003). Changes such as an increase in BMI creating increased intra-abdominal pressure can cause SUI with vomiting, coughing and sneezing (Abrams et al., 2010; Chiarelli & Brown, 1999; Viktrup et al., 2006; S L Wesnes et al., 2007). It is beyond the scope of this thesis to discuss all the risk factors affecting PFM dysfunction. Data are being collected on self-reported UI and associated risk factors in the present research.

### 2.42 Prevalence of urinary incontinence.

This section identifies the numbers of women with UI. Research in the area of UI is considerable in Australia, Scandinavia and the United Kingdom. The prevalence of UI in men and children will not be discussed as it falls outside the scope of this thesis.

Because methods of data collection vary in different studies, it is not always possible to distinguish the type or severity of UI and therefore the estimated prevalence of UI is varied. Also, people may not report UI because it is an embarrassing issue or they may not believe UI to be serious enough to warrant attention. In Australia, the estimated prevalence of UI in community dwelling women in 1998 was 12.8% in young age (n = 14,761); 36.1% in mid-age (n = 14,070); and 35% in older age (n = 12,893) (Chiarelli, Brown, & McElduff, 1999). This totaled an estimated 1.8 million women of whom an estimated (n = 742,000) 41.2% sought help (Neumann, Grimmer, Grant, & Gill, 2005a). The most recent data in 2009 from the Australian Bureau of Statistics estimated that 316,500 people experienced severe incontinence. Of the people with severe UI, (n = 209,000) 66% were female (Australian Government, 2012).

The prevalence of UI varies according to the different stages of life. The third International Consultation on Incontinence, reported 32 - 64% for all types of UI during pregnancy with the prevalence lowest in the first trimester, rising rapidly in the second trimester and increasing further in the third trimester. Parous women have a higher prevalence of UI than nulliparous women. Before pregnancy, parous women reported 24% prevalence rising to 42% during pregnancy and nulliparous women, from seven percent prior to pregnancy rising to 31% during pregnancy. Postnatally, UI was reported between 15 to 30% and was less prevalent amongst women who had a LUSCS (Buckley & Lapitan, 2010). Tables 2.2 and 2.3 are adapted from the results of a study of women (n = 15,307) (Rortveit et al., 2003). Table 2.2 reports the prevalence of SUI as this is the type of UI most commonly related to pregnancy. The prevalence of UI increases with age, and in individuals aged more than 50 years, UI tends to increase substantially (Australian Government, 2012), although studies found that in middle-age and older cohorts, there was little difference in the prevalence of UI between nulliparous and parous women (Chiarelli & Cockburn, 2002; Rortveit et al., 2003). The committee of the International Consultation on Incontinence collated the prevalence of UI from research papers (Buckley & Lapitan, 2010). There were 36 studies of the general population from 17 countries included in the summary in Table 2.4, which documents the prevalence for UI during the stages of life with outliers excluded.

Table 2.2.

*Summary of Studies Reporting Prevalence of Women with any Incontinence*

| Characteristic | Prevalence of UI by age group and type of delivery (n = 15,307) | | |
|---|---|---|---|
| | Nulliparae (n = 3,339) | LUSCS (n = 669) | SVD (n = 11,299) |
| Age (years) n(%) | | | |
| All age groups | 338 (10.1) | 106 (15.9) | 2,732 (21.0) |
| 20 – 29 | 168 (7.9) | 21 (13.5) | 283 (18.3) |
| 30 – 39 | 38 (8.5) | 40 (12.9) | 794 (21.2) |
| 40 – 49 | 72 (19.8) | 31 (19.9) | 1,230 (26.8) |
| 50 – 64 | 60 (15.2) | 14 (28.6) | 425 (30.0) |

*Note.* LUSCS = Lower uterine segment caesarean section; SVD = Spontaneous vaginal delivery. Adapted from Rortveit, G., Daltveit, A. K., Hannestad, Y. S., & Hunskaar, S. (2003). Urinary incontinence after vaginal delivery or cesarean section. *The New England Journal of Medicine, 348*(10), 900-907. doi: 10.1056/NEJMoa021788.

Table 2.3.

*Summary of Studies Reporting Prevalence of Stress Urinary Incontinence*

| | Prevalence of SUI by age group and type of delivery n = 15,307 (100%) | | |
|---|---|---|---|
| | Nulliparae | LUSCS | SVD |
| Age (years) | n = 3,339 | n = 669 | n = 11,299 |
| All age groups | 158 (4.7) | 47 (6.9) | 1,664 (12.2) |
| 20 – 29 | 67 (3.1) | 9 (5.8) | 163 (10.5) |
| 30 – 39 | 19 (4.2) | 18 (5.8) | 476 (12.7) |
| 40 – 49 | 34 (9.4) | 14 (9.0) | 790 (17.2) |
| 50 – 64 | 38 (9.6) | 6 (12.2) | 235 (16.6) |

*Note.* LUSCS = Lower uterine segment caesarean section; SVD = Spontaneous vaginal delivery. Adapted from Rortveit, G., Daltveit, A. K., Hannestad, Y. S., & Hunskaar, S. (2003). Urinary incontinence after vaginal delivery or cesarean section. *The New England Journal of Medicine, 348*(10), 900-907. doi: 10.1056/NEJMoa021788.

Table 2.4.

*Summary of Studies Reporting Prevalence of Women with Urinary Incontinence*

| Age (years) | All types UI (%) | SUI (%) | Mixed UI (%) |
|---|---|---|---|
| 20 – 39 | 7 – 37 with outliers | 4 – 23 | 1 – 11 |
| 40 – 59 | 31 – 48 | 16 – 36 | 13 – 26 |
| 60 – 79 | 30 – 61 | 8 – 23 | 21 – 30 |
| 80 + | 37 – 63 | | 28 – 29 |

*Note.* Collation of prevalence of UI from 36 studies so number of participants not documented. Adapted with permission from Buckley, B. S., & Lapitan, M. C. M. (2010). Prevalence of urinary incontinence in men, women, and children - current evidence: Findings of the Fourth International Consultation on Incontinence. *Urology, 76*(2), 266 - 270. doi: 10.1016/j.urology.2009.11.078.

Table 2.5 summarises research findings from studies that have measured the prevalence of UI during various stages of life and demonstrates the scope of the problem in the population of pregnant women, with data showing that the prevalence ranges from 31% to 58%. Included in Table 2.5 are results from research undertaken in Australia by Chiarelli and Cockburn (2002). The research was a retrospective analysis of data from the Women's Health Australia Project. The Women's Health Australia Project is a large study funded by the Australian Government Department of Health (DOH) which commenced in 1996 and is following women (n > 50,000) for a large range of health outcomes. The Project is currently funded until 2016 (Australian Longitudinal Study on Women's Health, 2014). As the present research is collecting data on the frequency of self-reported UI in a sample of pregnant women in WA, it is relevant to quote Australian data where possible.

The annual DOHWA Report (Hutchinson & Joyce, 2014) documented the complications of pregnancy, however, there were no published data reporting the prevalence of any type of incontinence in pregnant women in WA. As described previously, incontinence often commences in pregnancy due to PFM muscle dysfunction, and may lead to incontinence later in life (Bo, 2007a). As such, absence of these data may form a gap in the translation of evidence into practice (Glasziou, 2005) as it is important that local area clinicians and researchers can identify the prevalence and extent of the relevant health problem in their local populations. This present research surveyed women in WA to identify the frequency of self-reported UI in the sample population.

Table 2.5.

*Studies Reporting Prevalence of Urinary Incontinence During Life Stages*

| Participants n | Prevalence of UI n (%) | Life Stage | Country | Strategy | Reference |
|---|---|---|---|---|---|
| 96 | 30 (54.6) | Primiparae | England | Questionnaire | (Dolan et al., 2003) |
| 305 | 98 (32.1) | Primiparae | Denmark | Prospective interview | (Viktrup, Lose, Rolff, & Barfoed, 1992) |
| 43,279 | 25,121 (58.1) | 30 weeks' gestation | Norway | Questionnaire | (S L Wesnes et al., 2007) |
| 289 | 157 (54.3) | Pregnant | Scotland | Interview survey | (Whitford et al., 2007a) |
| 144 | 60 (41.6) | Pregnant | Scandinavia | Interview | (Morkved & Bo, 1999) |
| 144 | 54 (38.0) | 8 weeks' postnatal | Scandinavia | Interview | (Morkved & Bo, 1999) |
| 14,00 0 | 1,792 (12.8) | 18-23 years | Australia | Retrospective analysis of WHA data | (Chiarelli & Brown, 1999) |
| 13,738 | 4,959 (36.1) | 45-50 years | Australia | WHA | (Chiarelli & Brown, 1999) |
| 12,417 | 4,351 (35.0) | 70-75 years | Australia | WHA | (Chiarelli & Brown, 1999) |

*Note*. WHA = Women's Health Australia Project.

### 2.43 Costs of urinary incontinence.

Urinary incontinence is associated with reduced physical, educational and social well-being. There are also substantial financial costs for individuals with UI and the health systems more broadly (Alewijnse, Mesters, Metsemakers, & van den Borne, 2003; Doran, Chiarelli, & Cockburn, 2001). Urinary incontinence has been demonstrated to cause people to avoid physical activity thus leading to a higher risk of obesity and its associated co-morbidities including a reduction in the quality of life (Chiarelli et al., 1999; Doran et al., 2001; Grimby, Milsom, Molander, Wiklund, & Ekelund, 1993; Moore, 2001; Neumann et al., 2005a). These findings strongly suggest that education and strategies on how to maintain or improve PFM function and prevent incontinence, during pregnancy, could result in a decreased prevalence of UI leading to reduced physical, psychological and economic costs for individuals and for the wider health system.

The economic costs to health care systems for all types of UI in Australia in 2008 and 2009, were estimated at $201.6 million, and this did not include the costs expended in residential aged care. Seventy- two percent ($145.5 million) of the expenditure was spent on patients admitted to hospitals whilst the Continence Aids Payment Scheme, which subsidises or provides pads, cost $31.6 million. Out of hospital medical services cost $17.7 million and these aforementioned costs did not include the individual at home costs of laundry, clothing and time (Australian Government, 2012). Further costs included $11.4 million which was spent on incontinence related visits to general practitioners in 2010 (Deloitte, 2011).

The cost of non-surgical treatment for women with SUI was estimated from a systematic review of the research on behalf of the British National Health Service (Imamura et al., 2010). The review involved the following three steps to determine if non-surgical treatment, such as PFME, for SUI were cost-effective. Step one was surveying women (n = 188) to determine the treatment outcomes that were important to them, for example, sex and lifestyle issues. Step two, identified RCT (n = 88) which involved women (n = 9,721) to identify which non-surgical treatment options were most effective for reducing SUI. Step three, used a Markov economic model to ascertain the cost-effectiveness and clinical effectiveness of non-surgical treatments for SUI. The outcomes suggested that it might be worthwhile for the NHS to provide more intensive forms of PFM therapy for women with SUI. Non-surgical treatments have been shown to prevent or improve the symptoms of SUI. The author's clinical experience supports the findings of the NHS review, namely, that some women find that improvements of the symptoms SUI and not a complete cure may be sufficient to improve their quality of life. These women may not seek further treatment for SUI as a reduction in the symptoms of SUI may delay or postpone the need for surgery. A key recommendation from the NHS review is that further well-designed trials into non-surgical treatment options are conducted. The web-based PFM education programme being evaluated in the present research can be considered a non-surgical treatment option aimed at maintaining optimal PFM function during pregnancy.

### 2.44 Health seeking behaviour in people with urinary incontinence.

Urinary incontinence can be reduced or prevented with treatment which includes the prescription of a PFME programme. One of the strategies involved in the treatment of UI is education about the benefits of undertaking a PFME programme (Abrams et al., 2010; Haddow et al., 2005; Paddison, 2002). According to the International Continence Society guidelines, "continence promotion, education and primary prevention involves informing and educating the public and health care professionals that UI and faecal incontinence are not inevitable, but are treatable or at least manageable" (Abrams et al., 2010, p. 233). Neither the Australian Clinical Practice Guidelines for antenatal care 2012 and 2013 nor in the DOHWA guidelines (Australian Government Department of Health and Ageing, 2012, 2013; Hutchinson & Joyce, 2014; Joyce & Hutchinson, 2012) document UI or PFM dysfunction as problems for women who are pregnant. The prevalence of UI is high during pregnancy but the guidelines do not provide information about appropriate evidence-based treatment for UI. If UI is not recognised as a problem during pregnancy then health workers may be less likely to offer education on PFM and PFME or ask women if they are incontinent, and so fail to raise awareness on available treatment options.

A review of the research studies for the International Consultation on Incontinence committee, found that UI still largely remained a "hidden" problem with people unwilling to discuss it despite the negative effect UI had on their lives (Buckley &

Lapitan, 2010). In the eight British studies reviewed that included people with UI, an average of 34.3% of people sought help (Buckley & Lapitan, 2010). The people who had UI and sought help ranged from 12 to 53% whilst people who had SUI were less likely to seek help than people with other types of UI.

In support of Buckley and Lapitan (2010), Australian, British and American research reported that fewer than 50% of women with incontinence sought professional help (Chiarelli & Brown, 1999; Mason, Glenn, Walton, & Hughes, 2001c; Roberts et al., 1998). In Australia it was estimated that 742,000 (approximately 42%) of women with incontinence sought professional help (Neumann et al., 2005a) and these results corroborated with previous research in Norway (Hannestad, Rortveit, & Hunskaar, 2002). Researchers theorised that incontinence may not have been seen as a problem. Therefore, when evaluating education for PFME it is important to identify the frequency of UI and to find out if women know that PFME are an effective treatment for UI.

These findings discussed in Sections 2.41 to 2.45 when compared to national guidelines and recommendations, highlight the lack of translation of evidence into practice in the area of delivery of PFM and PFME education (non-surgical treatment for UI). This lack of evidence-to-practice for education in the WA guidelines (Australian Government Department of Health and Ageing, 2012, 2013; Hutchinson & Joyce, 2014; Joyce & Hutchinson, 2012) forms a gap in health care for pregnant women. This evidence-to-practice gap could feasibly be addressed by PT or midwives. Physiotherapists who specialise in Continence and Women's Health are specifically trained to treat PFM dysfunction. Student midwives are often taught about the anatomy and function of the PFM by PT who specialise in Continence and Women's Health (Parker, 2001). Midwives and PT who have specialist training in PFM dysfunction, may be appropriate professionals to provide education on the function and facilitation of PFM to pregnant women during the antenatal period and strategies that can increase pregnant women's access to education from these PT may be beneficial for prevention of PFM dysfunction and resultant UI in this population.

***Summary.***

Pregnancy is a stage of life that occurs for many women. During pregnancy, the balance of hormones change and there is an increased BMI due to the developing foetus. A combination of these events may cause PFM dysfunction leading to UI therefore it is recommended that pregnant women are encouraged to learn about PFM function and facilitation to help maintain or improve PFM function.

Antenatal education classes are considered by experts to be an important adjunct to antenatal care and can be a strategy for educating pregnant women about PFM and PFME. Although there has been a lot of research undertaken in the area of ANE, there is limited published evidence to support the efficacy of ANE but it is recommended that pregnant women attend ANE classes. Because of the amount of research already undertaken showing education programmes to pregnant women whilst they wait for clinic appointments may be an alternative method of informing these women about pregnancy-related topics (Miquelutti, Cecatti, & Makuch, 2013).

Pregnant women report that meeting other prospective parents during ANE classes is beneficial and the research conducted to date suggests a move towards ANE that caters for the needs of the pregnant women rather than promoting information that the health professionals believe the pregnant women should know. There are multiple studies that provide evidence that supports the role of education for PFM and PFME during the antenatal period as a means of reducing and preventing UI during the perinatal period. Women who develop UI during pregnancy have increased risks of developing UI later in life. A substantial proportion of the annual health budget is currently being used for treatment of UI and the associated co-morbidities. However, there is evidence that not all pregnant women attend ANE or report that they have received education on PFM and PFME. Since research has demonstrated that many women do not attend ANE, alternative strategies are needed to encourage exposure to evidence-based pregnancy-related information, including PFM and a PFME programme for all pregnant women.

## 2.50 Introduction to Health Education and Health Behaviour Change Theories

Section 2.22 discussed the importance of ANE as a means of health education, and in particular the role of ANE for promoting PFME programmes, prevention of PFM dysfunction and treatment related to continence. This health education includes education on PFME, during an ANE class, requiring the educator to be able to teach the women how to perform a correct PFM contraction. Therefore, health education for adults may be considered a key concept in facilitating successful delivery of a PFME programme and ANE more broadly. Sections 2.51 to 2.54 provide a relevant overview of adult education and health behaviour change theories, although a complete review of andragogy and relevant health behaviour change theories used in preventative health is beyond the scope of this thesis. This will help to clarify the andragogy and relevant health behaviour change theories used in the present research to develop and measure a PFM education intervention. Sections 2.55 and 2.56 review studies that have investigated the design and delivery of ANE and PFM education to pregnant women incorporating the use of health behaviour change theories. The methods of education reviewed included web-based findings from studies that have investigated web-based education and health-related education.

### 2.51 Theories of adult learning.

Education research (Conrad & Donaldson, 2011; Knowles, 1970; Kolb, 1984; Mainemelis, Boyatzis, & Kolb, 2002; Merriam & Bierema, 2014; Queensland Occupational Therapy Fieldwork Collaborative, 2007) concurs that the key principles of andragogy are that:

- adults are internally motivated and self-directed;
- adults bring life experiences and knowledge to learning experiences;
- adults are goal oriented;
- adults are relevancy oriented;
- adults are practical;
- adult learners like to be respected.

These researchers also emphasise the need to cater for different learner characteristics and styles because problem solving and changes in attitude and behaviour have been found to be influenced by an individual adult’s learning style. For example, some adults prefer to learn by hearing about a task, reflecting on the task and then practising the learnt task (Mainemelis et al., 2002); while others prefer to observe, describe and receive feedback on a task (Kolb, 1984). Therefore, it is

recommended that ANE also caters for women with different characteristics. These characteristics include pregnant women with different learning styles; variations in previous learning experiences; aged from 14 to late forties; high risk pregnancies; speak LOTE; varying levels of formal education, attitudes and values; and women with specific needs such as vision, hearing, and mobility impairments (Svensson et al., 2011). A short overview of relevant aspects of andragogy follows.
Adult learners have been described by educators as preferencing one of four learning styles (Kolb, 1984; Merriam & Bierema, 2014):

1. Divergence – come up with an alternative method of undertaking a task;
2. Assimilation – logical, re-examine facts and follow through with instructions if they believe the theory is sound;
3. Convergence – organise knowledge, focus on a problem and follow up with the correct solution;
4. Accommodation – rely on other people for information and practise new techniques.

Evidence suggests that any programmes designed for pregnant women should be designed keeping the principles of adult learning in mind (Alewijnse, Mesters, Metsemakers, & van den Borne, 2002; Alewijnse, Metsemakers, et al., 2003; Tighe, 2010). Accordingly, PFM education programmes should be designed with these principles in mind.

Adults learn constantly (Merriam & Bierema, 2014) and in today's society, they search the Internet for health-related issues. The speed and intensity of using the Internet has increased and this has brought about accelerated change and increased access to knowledge. Meeting the needs of online learners can be difficult as they must engage quickly with the technology and need a higher self-direction than the classroom-based learner. Recommendations with online learning are to identify the learner needs, make the experience positive and incorporate activities that address their learning styles, expectations and life experiences (Conrad & Donaldson, 2011). Too many activities will overwhelm the learner whilst fewer activities will invariably improve the quality of knowledge. Depth of thought may be greater in reflective online discussion than in a reactive classroom setting.

### 2.52 Health education.

Health education is defined as a consciously constructed opportunity for learning involving communication designed to improve health literacy, improve knowledge and develop life skills which are conducive to individual and community health (World Health Organisation, 1998). The antenatal clinic may be viewed as a site for health education, with the midwives and doctors potentially being expected to deliver all the relevant and required health information during appointments with women. Pregnancy has been demonstrated to be a time for implementing health behavior changes in regard to healthy eating and exercise (Wilkinson & McIntyre, 2012). The information relevant to a patient's health status is important because patients who are better informed are more likely to engage in positive health behaviours and participate in making decisions about their health (Fairley et al., 2003). It has been recommended that education for adults incorporate the principles of adult learning (Knowles, 1970). These principles are recognised in regard to ANE with researchers recommending the use of adult learning activities when providing ANE (Svensson et al., 2011). Specific design strategies recommended for health education are (van Merrienboer & Sweller, 2012):

- decrease the extraneous load - give one source of information instead of many sources; give a partial solution to the task which the learner must then finish; give the information in multimodal formats such as visual and spoken;
- manage the intrinsic load - start with an easy low interaction activity and gradually increase the complexity;
- optimise the germane load - use prompts to ask learners to explain the information;
- deal with the expertise reversal effect - demonstrate the task fully and then with the use of scaffolding encourage the learner to develop answers.

The five minute web-based PFM education intervention in the present research implements some of these design strategies and are discussed in Chapter 3 (Section 3.60).

### 2.53 Conceptual models of health behaviour change theories.

Health education usually involves encouraging clients to adhere to a change in health behavior. This section will briefly review the evidence for relevant models used in preventative health education designed to encourage positive changes in patient behaviour, focusing on those health behaviour models that have been used to design and evaluate continence education and research (Alewijnse et al., 2002; Burgio et al., 2008; Burgio et al., 1998; Chiarelli & Cockburn, 1999; Escott, Slade, & Spilby, 2009; Gillard & Shamley, 2010; Goode et al., 2003; Palmer, 2004). Health behaviour change models envelop many theories whose underlying rationale is that health is affected by behaviour and that these health behaviours have the potential for change. The operant conditioning theories (Skinner, 1965) incorporates habit training, verbal reinforcement and education. Cognitive behavioural theories encompasses, among other theories, the Health Belief Model (HBM) (Rosenstock, 1974a), the Transtheoretical Model of Health Behaviour Change (TTM) (Prochaska & Velicer, 1997) and Social Cognition Theory (SCT) (Bandura, 2001). Both operant and cognitive theories have been applied in the delivery of health education to the broad population (Bandura, 2001; Palmer, 2004; Rosenstock, 1974a; Skinner, 1965). The application of the health behaviour change theories are reviewed briefly in Sections 2.54 to 2.56 and particularly as they apply to continence education.

### *2.53.1 Health Belief Model.*

The HBM is a cognitive-behavioural theoretical model used to predict engagement in health behaviours in health prevention (Rosenstock, 1974a). It is the most commonly used theoretical model in health promotion and education (Hayden, 2009). The underlying concepts of the HBM are that individuals' perceptions of a disease will impact on their behaviours and engagement in strategies designed to reduce or prevent occurrence of the disease (Rosenstock, 1974a).

There are seven main constructs of the HBM and these are presented in Table 2.6. The seventh construct, self-efficacy can also be defined as "the conviction that one can successfully execute the behaviour required to produce the outcomes" (Bandura, 1977, p. 193) and the confidence an individual has that they have control over particular aspects of their life (Dweck, 2012). The definitions of the constructs of the HBM are presented in Table 2.6, showing how the constructs may be applied to the health behaviour of practicing PFME and therefore potentially preventing PFM dysfunction and UI.

Table 2.6.

*Constructs of the Health Belief Model Applied to Pelvic Floor Muscle Exercises*

| | Health Belief Model Constructs | Definition |
|---|---|---|
| 1. | Perceived susceptibility | An individual's assessment of the chance of developing UI or UI increasing |
| 2. | Perceived benefits | An individual's conclusion as to whether the new behaviour, ie engaging in PFME, is better than what is already practised, and whether PFME will be effective in maintaining optimal PFM function and preventing UI |
| 3. | Perceived barriers | An individual's opinion as to what will stop her adopting the new behaviour, ie engaging in PFME |
| 4. | Perceived seriousness | An individual's judgement as to the severity of the disease, ie PFM dysfunction and/or UI |
| 5. | Modifying variables | An individual's personal factors that affect whether a PFME programme is adopted |
| 6. | Cues to action – Motivating factors | Individual's factors, ie self-efficacy and confidence, that will begin the process of changing behaviour including undertaking a PFME programme |
| 7. | Self-efficacy | Personal belief in an individual's ability to perform an action/behaviour, ie a PFME programme |

*Note.* Adapted from Hayden, J. A. (2009). *Introduction to health behaviour theory.* London, England: Jones and Bartlett Publishers.

The HBM conceptualises that an individual's perceptions of susceptibility, seriousness, benefits and barriers are affected by modifying the cues to action and self-efficacy, and this has the potential to affect or change an individual's behaviour. Consequently, the HBM assists in conceptualising engagement and adherence to health-related preventative behaviours. It has been shown that the two main constructs most likely to influence the adoption of a preventative health behaviour are constructs numbered one and four shown in Table 2.6. These are the individual's feelings of susceptibility to the disease and whether the individual perceives the disease has serious consequences (Rhodes, Fishbein, & Reis, 1997). Palmer (2004) conducted a review of research related to UI which was guided by health behaviour change theories. The researcher concluded that the effect of a primary intervention for the prevention of UI in an individual related to constructs numbered one to four of the HBM. All four constructs can be used to design interventions to maintain behaviours to reduce UI. This can be explained by conceptualising that pregnancy is a time of change when women are susceptible to UI, access health services and are receptive to health information (Wilkinson & McIntyre, 2012). The health information can include the benefits of maintaining or improving PFM function and cues to action for practicing PFME in order to break down perceived barriers for practicing PFME and prevent the consequences of developing chronic UI.

The HBM has been successfully used in multiple studies and health areas to design, deliver and evaluate health research including dental hygiene, paediatric nursing, screening for cancer and family planning (Buckingham, 1997; Buglar, White, & Robinson, 2009; Campo, Askelson, Routsong, Graaf, & Losch, 2008; K. S. Hall, 2012). An education review on women's health noted that the HBM's adaptability and holistic nature can assist to understand modern contraceptive behaviour and prevent unplanned pregnancies; the concepts applied to education in this area can promote positive outcomes if the HBM is applied more rigorously (K. S. Hall, 2012). In the area of women's health a study was conducted that applied the constructs of the HBM, with the aim of developing a postnatal continence promotion programme (Chiarelli & Cockburn, 1999). The study used focus groups with questions based on the constructs of the HBM to gain information on the knowledge, perceived susceptibility, perceived severity and beliefs of postnatal women on UI and PFME and their ability to undertake a PFME programme. The results highlighted the following areas of deficit: a lack of knowledge and susceptibility to UI; lack of knowledge of PFM; need for individual feedback on PFM function; strategies as reminders to do PFME; and education on care of the perineum These researchers also concluded that the application of the HBM to provide a customer focus and enhance customer satisfaction can ultimately provide information that could assist to develop an effective PT continence promotion programme (Chiarelli & Cockburn, 1999).

### *2.53.2 The Transtheoretical Model of Health Behaviour Change.*

Another frequently used model that is implemented to explain an individual's change in health behaviour and to design health education is the TTM. This model has been used in a variety of health areas such as smoking, physical activity and the management of chronic diseases such as diabetes (Adams & White, 2003; Alewijnse et al., 2002; Prochaska & DiClemente, 1983; The Royal Australian College of General Practitioners). The TTM describes the processes of change and suggests that a change in health behaviour involves six stages. The flow of the processes of change is shown in Table 2.7. An individual can cease changing their behaviour at any stage and may either revert one stage or start again with the pre-contemplation stage (Prochaska & Velicer, 1997).

When women are pregnant there is an increased risk of developing PFM dysfunction and therefore an increased risk of developing UI, which may act as a trigger to encourage a positive change of behaviour and commmence a PFME programme. Intervention such as a web-based PFM education programme by a PT may encourage the participant to move from the contemplation stage to the action stage, set goals and strategies to support the change in behaviour and adhere to a PFME programme.

Table 2.7.

*Role of a Health Educator During the Processes of Change of the Transtheoretical Model of Health Applied to Pelvic Floor Muscle Exercise Programmes During Pregnancy*

| Stage of change | Role of health professional | Possible education techniques used by a health professional |
|---|---|---|
| Pre-contemplation | Discussion with pregnant woman. Reflection on risks and problems associated with changing behaviour and commencing PFME. | Discussion/Reflection on doubts<br>Education/Use of resources |
| Contemplation | Positive reasons for change. Increase the client's self-efficacy to undertake a PFME programme | Discuss pros and cons of engaging in PFME<br>Emphasise positive outcomes, such as, prevention of UI, maintenance and improvement of PFM function |
| Preparation | Help the client decide on the best course of action for them. Advantages and disadvantages of undertaking a PFME programme. | Problem solving<br>Goal setting<br>Identify support, resources and rewards |
| Action | Support goal setting and start the change. Prescribe a PFME programme. | Improve ability to deal with barriers<br>Feedback, reinforcement & rewards |

Table 2.7. (continued)

*The Role of a Health Educator During the Processes of Change of the Transtheoretical Model of Health. Applied to Pelvic Floor Muscle Exercise Programmes During Pregnancy*

| Stage of change | Role of health professional | Possible education techniques used by a health professional |
|---|---|---|
| Maintenance | Identify and use strategies to support the change such as functional PFME. | Ongoing support<br>Positive reinforcement<br>Health benefits |
| Relapse | Assist the client to rekindle the motivation to re-commence PFME. | Determine the trigger<br>Re-evaluate readiness and barriers |

*Note.* Adapted from Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12*(1), 38-48. doi: 10.4278/0890-1171-12.1.38.

The use of behavioural change theories to design effective health education is recognised by clinical bodies. For example, The Royal Australian College of General Practitioners (The Royal Australian College of General Practitioners, 2005) and NSW Department of Health (Carll & Littleford, 2008) recommend using the HBM and TTM to promote self-management of chronic conditions, such as diabetes, obesity and stroke. These guidelines (The Royal Australian College of General Practitioners, 2005) summarises that chronic conditions require a client-centred, self-management approach so it is important to emphasise that the client is active in their own treatment or health care. The recommendations are that it is necessary to set the goals according to the stage of change and the perceived needs of the client and then choose an appropriate intervention.

Researchers who conduct studies in the area of UI, which can be classed as a chronic condition, have noted there is often a high rate of participant attrition (Bo & Haakstad, 2011; Glazener et al., 2001; Morkved et al., 2003). By identifying the stage of change and designing an intervention appropriate for that stage, there may be an increase in the success rate. The TTM has been used successfully to develop population-based interventions, for example, education on PFM and UI in a hospital waiting room, because awareness of the problem may be raised and an individual may come forward for treatment (Palmer, 2004).

Whilst like the HBM, the TTM has been found to be a valuable model of behaviour change, it has also been found to have some limitations. The TTM is subjectively sensitive in that it can be interpreted and evaluated in different ways by different researchers. The maintenance stage of the TTM is defined as lasting more than six months but much of the research does not measure the change of behaviour or effectiveness of the interventions for more than six months (Adams & White, 2003). This is important because, as discussed later in Section 2.60, adherence to an activity is paramount to achieving the optimal benefits from the intervention or treatment which includes prescription of a PFME programme.

### *2.53.3 Other theories of health behaviour change used in continence research*.

Another theoretical model applied to health education is the SCT, which Bandura (2004) postulated is a better model than the TTM because human nature is too complex to be divided into separate stages and that stages one and two of the TTM are basically the same. The SCT, like the HBM, is a theory positing that it influences health behaviour. Lifestyle habits and environmental influences regulate the quality of health and the SCT focuses on promoting self-management of health to prevent disease (Bandura, 2004). There are four major components in the SCT which comprise of expectations, observational learning, self-control and self-efficacy. The first two components called expectations and observational learning are applicable to individuals who are able to make connections between their behaviour and the consequences of their behaviour (Bandura, 2001; Palmer, 2004). An example of making the connections would be undertaking a PFME programme that reduces or prevents UI. The third component, self-control, can guide an individual to use a daily self-management routine for UI (Palmer, 2004). The SCT concludes that two main factors determine whether preventative action is likely to be taken. One factor is that the individual's expectation or benefit of undertaking the behaviour outweighs the negative consequences of not undertaking the behaviour. The second factor is that the individual must display self-efficacy or belief that she has the ability or skill to perform the preventative behaviour (Rhodes et al., 1997).

The SCT has been used successfully in the self-management regime for UI (Palmer, 2004). The four components of the SCT fit well with the design of web-based PFM education, to prevent or reduce UI which encourages the application of all the components in order for the PFME programme to be successful. This includes increased knowledge of UI and PFME and the application of PFME to reduce UI.

## 2.54 Application of conceptual models of health behaviour change.

While multiple studies have used these behaviour change models in modified forms to design and deliver health education programmes (Alewijnse et al., 2002; Buckingham, 1997; Buglar et al., 2009; Campo et al., 2008; Chiarelli & Cockburn, 1999; K. S. Hall, 2012; Prochaska & DiClemente, 1983; The Royal Australian College of General Practitioners, 2005), the overarching goal of such education is to encourage the individual adult to change or adopt certain positive health behaviours. Systematic reviews (Abraham & Michie, 2008; The Royal Australian College of General Practitioners, 2005) of health behaviour change models have identified the successful components that are recommended to be incorporated into programmes. These can be summarised as:

- motivation: identifying an individual's stage of behaviour change and tailoring the intervention or treatment to the stage of change, such as, the individual being goal orientated and setting specific, measured, achievable, realistic and timely goals;
- knowledge of the condition: understanding the rationale for treatment or behaviour change;
- co-morbidities: the individual understanding the long term health implications of not changing behaviour;
- health beliefs: accounting for religious, cultural and family background as well as the level of literacy;
- self-efficacy: the individual's confidence in undertaking changes in health behaviour and the advantages or barriers to making the changes.

One criticism is that the behaviour change models ignore the ability of humans to make rational decisions (Harari & Legge, 2001). Another criticism is that there is a lack of standardisation of interpretation and evaluation of the different models which is supported by research that aimed to evaluate the content of behaviour change interventions and sought to recommend which combination of techniques are more effective (Abraham & Michie, 2008). Behaviour change research has recommended that when using the Consolidated Standards of Reporting Trials (CONSORT), as used in the present research, researchers list the behaviour models used in their interventions and that standardised intervention manuals be prepared to show how the behaviour models are linked to the design of the intervention (Abraham & Michie, 2008).

### 2.55 Conceptual models of health behaviour change used for design of antenatal education and continence promotion.

Sections 2.50 to 2.54, briefly reviewed how behaviour change theories have been understood in health education. This section reviews studies that have investigated the design and delivery of ANE including PFM education and also PFM interventions to reduce UI in women.

While women are often offered ANE classes as part of antenatal care, it has been suggested that ANE has been developed with little input from psychologists or understanding of how psychological factors influence childbirth (Escott et al., 2009). Identifying pregnant women's self-efficacy and coping preferences, during ANE, may be one way of incorporating behaviour change models into ANE with the aim of enhancing the effectiveness of classes (Escott et al., 2009). There is scant published research that has investigated different behavioural models as related to a recommended method of ANE. A systematic review which reviewed trials that tested ANE interventions found that the outcomes measured physical properties, such as breast feeding, perceived levels of anxiety and use of medications, rather than the specific health behaviour models used to facilitate the ANE (Gagnon & Sandall, 2007).

Operant and cognitive theories have been applied to adults who are both continent and incontinent (Alewijnse et al., 2002; Bandura, 2001; Burgio et al., 2008; Burgio et al., 1998; Chiarelli & Cockburn, 1999; Goode et al., 2003; Palmer, 2004; Rosenstock, 1974a; Skinner, 1965). Cognitive behavioural theories have been used successfully for the treatment of SUI, urgency and mixed UI (Burgio et al., 2008; Burgio et al., 1998; Goode et al., 2003) in older women dwelling in the community. The interventions have consisted of behavioural training combined with bladder diaries, written information, pelvic floor electrical stimulation or drug treatment. Palmer (2004) reviewed the HBM, TTM**,** SCT and operant conditioning health behaviour change theories which have all been used in design of interventions which can be tested for their impact on UI. Reference to these studies has been made for over 40 years in research on UI, both for institutionalised adults and non-institutionalised adults with urgency UI and SUI (Palmer, 2004) with these interventions informing multiple research studies and clinical practice. These studies have shown that interventions using these safe and conservative theories can be effective in reducing UI and be beneficial to patient satisfaction with perceived improvement and reduction of bladder symptoms. Recommendations are to continue research on testing these theories. Participant bladder diaries, written information and education on PFME for pregnant women in the present research will be used to encourage behaviour training including reminding participants to practise PFME and adhere to a PFME programme.

The implications of using the concepts of health behaviour change to design health education interventions are discussed in Section 2.53. Health behaviour change theories, when used to design PFM education, starts with a premise that the individual values being continent and does not wish to become incontinent (Palmer, 2004). The application of the concepts of health behaviour change to a primary health prevention context, such as delivering PFM education to maintain the function of the PFM, has the potential to reduce UI in both group and individual settings (Alewijnse et al., 2002; Chiarelli & Cockburn, 1999). While some researchers report a lack of rationale for the selection of theories in health education (Alewijnse et al., 2002), more recently, other researchers in the area of continence have found that the HBM is an effective tool for investigating behaviours that are voluntary and health-related (Gillard & Shamley, 2010). A small study of postnatal women (n = 10) who developed perineal tears during delivery, used the concepts of the HBM to determine the factors affecting adherence and self-motivation to a PFME programme. Results showed that the participants identified their fear or experience of UI and their perceived self-efficacy as motivating factors (Gillard & Shamley, 2010). Although this was only a small sample, the results suggest that the HBM is an appropriate cognitive-behavioural theoretical model for use in the research related to delivery of a PFME programme. In other larger studies, researchers have recommended that research which evaluates the perceived susceptibility, benefits, severity and barriers to uptake and adherence to a PFME programme can help in the future design of interventions to reduce UI (Chiarelli & Cockburn, 1999; Gillard & Shamley, 2010; Palmer, 2004). These research recommendations are able to be incorporated and evaluated with the application of the HBM.

The International Continence Society also recommends the need for further research to find effective ways of delivering education to the broad population on continence issues (Abrams et al., 2010). Antenatal education facilitated by a PT may also be considered a form of public and preventative education because facilitating PFME, during either an ANE class or antenatal clinic visit when UI is not present, is a preventative health behaviour in an asymptomatic stage. The novel education programme to be evaluated in the present research has been designed and will be evaluated using the concepts of the HBM. Participants' knowledge of PFM and confidence in and beliefs about engaging in a PFME intervention will be measured as part of the evaluation. The desired health behaviour change of adherence to a PFME programme will also be measured.

### 2.56 Health education strategies for antenatal education and continence promotion.

As discussed earlier in Section 2.20, a Cochrane Systematic Review found that there is limited evidence about the effective methods to deliver ANE and also an absence of measured outcomes in this area of research (Gagnon & Sandall, 2007). In the absence of a definitive conclusion on the best method of delivery for ANE, other studies have described the variety of pedagogical strategies employed to facilitate ANE classes (Chiarelli & Cockburn, 2002; Svensson et al., 2009; Svensson et al., 2011; Tighe, 2010). Results from these studies recommended that adult education strategies be used during ANE. Some examples of adult education strategies are ice-breakers, problem solving scenarios, discussion and practical activities during ANE classes. The practical activities can include practising PFME during the class. These strategies are also recommended as being suitable for delivering other health education programmes (Fairley et al., 2003; Knowles, 1970). Involvement and client participation is thought to increase participants' learning more than didactic or expository approaches (Gagnon & Sandall, 2007; Svensson et al., 2009; Tighe, 2010). However, these studies have not investigated whether any specific method of education improved the knowledge of PFM function and anatomy or the uptake of PFME by pregnant women who attended ANE classes.

There has been limited investigation about how the style of ANE delivery impacts on the outcomes of ANE. Recently, a RCT (n = 170) was conducted which evaluated using two different approaches to facilitating ANE (Svensson et al., 2009). However, this study was not specifically aimed at education on PFM or the uptake of PFME, but compared a regular ANE class with a new ANE class which included more content on parenting. Two of the measures used in the RCT were perceived maternal parenting self-efficacy and perceived parenting knowledge. The ANE approach that included small group work, ice-breakers, discussions and activities had significantly significant higher positive outcomes compared to the regular ANE class. Reviews of ANE have recommended that more high quality research be conducted in the area (Gagnon & Sandall, 2007; Nolan, 2009; Tighe, 2010).

Pelvic floor muscle education is often conducted by midwives and PT (Svensson et al., 2007; Whitford, Alder, & Jones, 2007b) who may not have training in adult education. As well as the adult education techniques used to facilitate ANE, research has concurrently identified that there are four key criteria which facilitate successful delivery of PFM education (Paddison, 2002). These four criteria are:

1. A skilled tutor should provide the PFM education;
2. The participant must have a condition that could potentially benefit from undertaking the PFME;
3. The participant requires the ability to voluntarily contract the PFM;
4. The participant is motivated to adhere to a PFME regime.

With reference to criterion one, Paddison (2002) proposed that a skilled tutor is required to facilitate PFM education in order for the education to be successful. Such a contention concurs with the NICE guidelines, which recommend that PFME as the conservative management of UI, be facilitated by a PT or a specialist nurse (Freeman & Monga, 2009). Commensurate with these findings, it is also recommended by the International Continence Society that the health professionals who deliver information on continence have the requisite education and training (Newman et al., 2010).

A UK study (n = 289) found that 225 (77.9%) pregnant women received information on PFME during their current pregnancy. Of the 225 women who received PFME information the most common sources were from books 159 (70.7%), magazines

97 (43.1%), ANE classes 88 (39.1%), leaflets 68 (30.2%) and midwives 49 (21.8%) (Whitford et al., 2007a). These sources may not include education from a tutor who is skilled in providing PFME training or adult education theory. Another study of primiparae women (n = 759), found that 64% of women had been taught PFME either during pregnancy or after delivery. Of these women, 76% were taught via verbal instructions and 55% using written instructions (Fine et al., 2007). With written instructions only, women reported difficulty understanding how to correctly facilitate PFME (Haddow et al., 2005). The researchers cautioned against providing written or verbal instructions only, (since correctly undertaking PFME is paramount to preventing PFM dysfunction) and suggested that at least two instruction sessions should be implemented in the perinatal period (Fine et al., 2007; Haddow et al., 2005). Results suggest that there is a need to improve methods of delivery of education on PFME (Fine et al., 2007). These researchers suggested that PFME should be facilitated by PT, a specialist nurse or a professional who has the requisite education and training and not only via books or magazines.

Two systematic reviews which included studies that evaluated the effect of engaging in PFME on UI recommended a multi-faceted approach to education on PFM function and facilitation (Alewijnse et al., 2007; Morkved, 2007). One review concluded that PFM education should incorporate the use of diagrams, drawings and models to enhance understanding by the pregnant woman. Other recommendations were that explanations should be provided regarding a correct PFM contraction and then the woman should be encouraged to practise the technique and that a home PFME programme be prescribed (Morkved, 2007). Additionally, the review suggested that the following educational strategies may also assist with learning to do PFME, as all the strategies are seen as enhancing learning and increasing adherence to a PFME programme: the use of goal setting, writing personal treatment goals, modeling, story-telling and feedback (Alewijnse et al., 2007). Findings from these studies suggest that adult learning principles may be important to assist with learning PFME. Consequently, the use of a multi-faceted approach which can encompass the many different learning styles may be a strategy to increase adherence to PFME.

As discussed in Sections 2.31 to 2.33, regular supervision of PFME programmes showed increased reduction of UI. Two independent reviews of published data, that reported findings about PFME training during pregnancy, demonstrated that women who undertook weekly appointments or regular supervision showed up to a 70% reduction in symptoms of SUI (Price et al., 2010) than women who had little or no supervision undertaking PFME (Hay-Smith et al., 2011; Price et al., 2010). Also, women who received individual appointments with face-to-face tuition and additional group classes including ANE reported an improvement in symptoms of SUI (Hay-Smith et al., 2011). These findings are similar to those found in the systematic review, discussed in Section 2.53 (Boyle et al., 2012), which reported that higher intensity PFME are more effective than lower intensity PFME for reducing the symptoms of UI.

Some researchers have suggested that PFM education can be supervised individually or in groups (Bo & Haakstad, 2011; Morkved, 2007). One recent Swedish RCT conducted among sedentary pregnant women **(**n = 105), evaluated the benefits of a group population-based approach on the effectiveness of instruction on PFME during a general fitness class during pregnancy (Bo & Haakstad, 2011). The intervention group received three sets of eight to 12 contractions of the PFM, twice a week and usual antenatal care, whilst the control group received usual antenatal care. Results from the study reported no significant difference in UI between the two groups (Bo & Haakstad, 2011). The researchers suggested that the lack of effect may have been due to small sample size, untrained instructors, no assessment of the woman's ability to perform a correct PFM contraction and poor adherence to PFME. These researchers have observed that PFME are regularly taught to pregnant women at a single attendance at ANE classes (Bo & Haakstad, 2011**),** hence other means may be required to deliver and promote successful adherence to a recommended PFME programme taught during ANE which includes trained instructors.

Seeking individual treatment for PFM therapy or UI from health professionals, such as PT who have specialised in Continence and Women's Health, may not be practical or cost effective for women or the health system concerned. Whilst the Australian Physiotherapy Association does not give recommendations on fees for consultation with Continence and Women's Health PT (Australian Physiotherapy Association, 2014), telephone calls to private specialists in this area revealed fees varied from $145 to $210 per hour for an initial consultation and $85 to $105 for a follow up appointment which lasted 30 minutes. Specialist PT employed in the public sector receive a starting salary of $91,544 per annum (Government of Western Australia Department of Health, 2014a), so seeking individual treatment for UI is costly Australian tax payers. Other limitations in attending individual appointments includes long distances that some women have to travel for treatment and the shortage of health workers with specialist training to treat incontinence (Imamura et al., 2010). Therefore other approaches might need to be tested for effective teaching of PFME and promoting adherence to a PFME programme.

***Summary.***

The use of the principles of adult learning, including use of techniques designed to cater for differing learning styles is recommended for incorporation into health education programmes designed for adults. This applies to the skills and information taught during ANE, which often asks pregnant women to change their health behaviour during the antenatal period. Key health behaviour change theories applied to health education have demonstrated convincingly that health education must include goal setting and exploration of the individual's belief system (Abraham & Michie, 2008). The principles of health behaviour change will be employed in the design of the antenatal PFME intervention to be evaluated in this research.

## 2.60 Adherence to a Pelvic Floor Muscle Exercise Programme

The previous section described education strategies for prescribing PFME programmes and suggested that educational strategies, such as drawings and a home exercise programme, may also assist women to adhere to a PFME programme. When PFME are prescribed as a part of treatment programmes, including when PFME have been prescribed for symptoms of UI, there are frequently low levels of long term adherence to the PFME programme. The difficulty in maintaining adherence to a PFME programme for prevention or treatment of UI is well recognised in the literature and has been the topic of research investigations. This section examines research that has been undertaken to find out the most effective means of promoting adherence in people, usually with UI, to regularly perform PFME throughout the adult stages of life.

The definition of adherence, from a medical perspective, is of voluntary choice in which a commitment is made by the patient to closely follow a treatment programme (Dorland, 2007). Presented is a brief explanation and practical summary of evidence relevant to adherence to a PFME programme. As discussed in Section 2.50, health behaviour models conceptualise that a pregnant woman must first engage or take up a PFME programme, therefore adherence to such a programme pre-supposes that the woman has commenced PFME.

The level of self-efficacy, leading to the engagement of an individual, may predict an individual's ability to adhere to a new behaviour such as PFME. Also discussed in Sections 2.50, health behaviour theories conceptualise that self-efficacy, attitude to the desired behaviour and social influences are predictors of the intention to undertake a behaviour change (Bandura, 2001; De Vries, Dijkstra, & Kuhlman, 1988) which may include the motivation to adhere and perform PFME (Gillard & Shamley, 2010). These predictors of concepts of self-efficacy, attitude to the desired behaviour and social influences (Alewijnse et al., 2001) have been shown to have a mixed influence on adherence to a PFME programme although self-efficacy (confidence) to perform PFME correctly, reliably predicts practise of PFME (Whitford & Jones, 2011).

Adherence and maintenance of PFME is recognised as critical for the success of PFM education and PFME interventions in preventing or improving SUI (Alewijnse et al., 2007; Chiarelli & Cockburn, 1999; Gillard & Shamley, 2010; Reilly et al., 2002). A low level of adherence to PFME is recognised as one of the key reasons why a PFME programme may not be a successful treatment for SUI (Ismail, 2009; Whitford & Jones, 2011) especially in the long term. Researchers undertook interviews with seven Continence and Women's Health PT and six women who suffered from UI, to analyse the determinants of adherence to a PFME programme (Alewijnse et al., 2002). They identified that doing PFME involves positively integrating the PFME into daily life and avoiding behaviours that negatively impact UI. Positive impacts that were identified as enhancing adherence included good communication between the PT and patients, an understanding, by the patient and PT, of the anatomy and function of the PFM, application of behavior change strategies and clear levels of knowledge about UI.

A survey was designed to measure how well women with UI (n = 129) adhered to PFME programmes (Alewijnse et al., 2001). The predictors of intention to adhere to PFME programmes were the amount of UI per wet episode and the women's perceptions of their ability to do the PFME. Recommendations were that increasing self-efficacy during PFME health education interventions could promote adherence. These researchers (Alewijnse, Metsemakers, et al., 2003) extended their study to include a RCT to determine the predictors of long term adherence to a PFME programme in women with SUI, urgency UI and mixed UI (n = 129). The intervention was a combination of a self-help health education guide and a PFME programme supervised by PT who specialised in Continence and Women's Health. The women with UI were assessed up to a year after treatment commenced which fulfills the criteria for the TTM maintenance period being more than six months. The self-help health education guide had no additional effect on adherence or treatment outcomes. Overall, 67% of the women followed the PFME programme, supervised by PT, on four to seven days per week, up to one year after treatment was initiated, and 64.4% were cured or had improved by 50%. Women with more wet episodes had higher adherence to a PFME programme than women with fewer wet episodes of UI.

The above research supported the understanding that increased self-efficacy in adults during health education was a necessary prerequisite for meeting the aim of encouraging adherence to a PFME programme. The two studies (Alewijnse et al., 2001; Alewijnse, Metsemakers, et al., 2003) provided evidence for the concept of perceived severity of a health problem described by the HBM and the ASE as it found that women with frequent episodes of UI and high self-efficacy were more likely to practise PFME.

Studies that have investigated adherence to a PFME programme found that face-to-face treatment for UI by a PT involving provision of a PFME programme is more effective than solely prescribing a home exercise programme which incorporated handing out an information booklet to promote discussion (Alewijnse, Metsemakers, et al., 2003; Chiarelli & Cockburn, 2002). In an Australian RCT (Chiarelli & Cockburn, 2002), which was conducted in a population of postnatal women (n = 676), the women were randomised into two groups. Participants in the intervention group (n = 348) received face-to-face education by a PT on PFME including strategies to increase adherence to a PFME programme, such as stickers and reminders from a partner, in addition to usual antenatal care with feedback and a telephone interview eight weeks later. The control group (n = 328) only received an information booklet to promote discussion and were not visited by a PT. Both groups received a follow-up telephone survey and a bladder diary three months postnatally to establish the levels of adherence to a PFME programme and frequency of UI. The results showed significantly fewer women in the intervention group had severe UI compared to the control group and that significantly more women in the intervention group were undertaking adequate levels of PFME compared to the women in the control group.

A more recent audit of NICE guidelines (2009) recommended that strategies be developed to improve awareness and adherence to PFME. Two strategies suggested were posters to increase awareness of PFM and PFME during the antenatal period and stickers that remind pregnant women who are already practicing PFME to continue their regular PFME programme (Ismail, 2009). The rationale for these recommendations is highlighted by individual studies which explain that encouragement to undertake a regular PFME be included in any education for pregnant women (Mason et al., 2001b) as short term adherence to a PFME is a predictor of long term adherence (Alewijnse, Mesters, et al., 2003).

A systematic review of studies which have investigated adherence to PFME was conducted in 2007 (Alewijnse et al., 2007). This review recommended useful clinical strategies to improve adherence by an individual to PFME programmes. These are:

- implement intensive therapy sessions;
- increase or promote self-efficacy of the individual, as discussed previously;
- include reminders in the treatment programme, for example phone calls and red dots (stickers);
- follow the International Continence Society guidelines;

- evaluate the treatment goals and provide feedback and reinforcement to the individual (Alewijnse et al., 2007).

There were no conclusive findings about which strategies or combination of strategies would have the maximum affect to enhance adherence to PFME. A later systematic review (Hay-Smith et al., 2011) designed to compare different approaches to PFME programmes for women with UI (n = 1,490) included 21 trials excluding ante and postnatal women because women who are or have been pregnant can be a confounding factor due to the effects of pregnancy on PFM function. The review was not specifically evaluating adherence to a PFME programme and found the evidence was insufficient to make strong recommendations, but recommended that women who received regular supervision of PFME programmes were more likely to report decreased UI compared to women undertaking PFME with little or no supervision. As adherence to a PFME programme probably increases the number of PFME undertaken it could be argued that increased supervision increases adherence to a PFME programme. Discussion from the review commented that measurement of adherence and the best way to measure adherence is important during trials.

A review of trials (n = 88), which included women with SUI (n = 9,721), found that treatment with PFME was more effective than no treatment for improvement of SUI. The long-term success of PFME to reduce SUI tends to decline over time probably due to reduced levels of adherence which is critical for success, as the women found the change in behaviour difficult to maintain (Imamura et al., 2010). This review recommended that research on efficient and effective methods of following up women who have commenced a PFME programme be undertaken with the aim of better understanding and so potentially increasing long term adherence to PFME and reducing SUI.

Additional strategies that have been suggested to encourage adherence to a PFME programme are that the woman should decide when and where to do the PFME, so they are realistic and fit in with daily life, and that a participant diary is kept to encourage adherence to the programme (Haddow et al., 2005; Morkved, 2007; Paddison, 2002). It has also been suggested that exercise tapes (Paddison, 2002), help to reinforce and encourage patients to adhere to PFME programmes. Other studies have shown that information, both verbal and written (Alewijnse et al., 2007; Little et al., 2001; Paddison, 2002; Sluijs, van der Zee, & Kok, 1993), helps patients to adhere to PFME programmes. A study of women with symptoms of any type of UI (n = 129), demonstrated that there was no correlation between the number of reminder phone calls and reminder stickers related to improved adherence to PFME (Alewijnse, Mesters, et al., 2003). In a more recent study, these same investigators searched for strategies to enhance adherence to a PFME programme and their findings supported Morkved's (2007) research (Alewijnse et al., 2007). Health education which is designed to influence self-efficacy; includes additional PFM therapy treatment sessions; and use of telephone calls as reminders to exercise, both of which are shown to enhance adherence to a PFME programme. Consequently, the use of a multi-faceted approach to health education on PFM which also encompasses the many different preferences for learning styles may be a strategy to increase adherence to a PFME programme.

While the strategies described have been found to increase adherence to PFME, researchers have suggested that further strategies for improving adherence are still needed (Agur, Steggles, Waterfield, & Freeman, 2008). The recent Application for phones discussed in Section 2.70 (Continence Foundation of Australia, 2013) is a new strategy that is aimed to increase adherence to PFME although there has been limited research to date to evaluate its effectiveness.

***Summary.***

There is strong evidence that adherence to a prescribed new treatment programme is crucial to improving the required health outcomes. A treatment programme often involves a change in health behaviour. Being able to maintain or adhere to a change in behaviour when undertaking PFME is usually more successful if the individual has a high or increased self-efficacy; belief that the treatment will be successful; and supervision from a health professional with training in treating continence. Research findings to date suggest that the reason PFME may be unsuccessful in reducing or preventing UI is due to low levels of adherence to these exercises. Therefore it is important that further research that investigates new methods of designing and delivering education about PFME and measures their effect on adherence to PFME is conducted.

## 2.70 Web-Based Education

New approaches or education models for teaching PFME and promoting adherence to a PFME programme could include the use of web-based methodologies. Educational institutions and individuals, as well as health professionals, are increasingly using the Internet and personal technological devices for communication and to seek information. This section analyses the relevant research on the use of web-based education in the health arena, focusing on web-based programs relevant to PFME where available. While a complete review of e-health and web-based education is beyond the scope of this thesis, a short overview is provided of this education methodology, prior to the review of PFME and ANE programmes that have accessed these new tools.

Web-based education is a new and growing area of e-health. “Web-based learning encompasses all educational interventions that make use of the Internet (or a local intranet)” (Cook, 2007, p. 37). A Systematic Review of research into web-based health education demonstrated that people use the Internet to seek social support, gain knowledge, confirm and reassure beliefs, make a decision and support behaviour change (Bernhardt & Felter, 2004; Murray, Burns, See Tai, Lai, & Nazareth, 2009). Accordingly, a web-based PFM education programme is a tool which may be a feasible means of raising knowledge and awareness of PFM and PFME among pregnant women.

A study that reviewed ANE (Lothian, 2008) suggested that pregnant women needed to know how to access evidence-based information on the Internet. These researchers envisaged ANE courses being developed and presented using Webinars and interactive web-sites. A subsequent Swedish survey of pregnant women (n = 182) found that 84% of pregnant women accessed the Internet for pregnancy-related information, but it was noted that the women were not necessarily able to determine if the information was accurate (Larsson, 2009). A more recent survey of pregnant women and their partners (n = 135) also found that 95% of participants at ANE have sought pregnancy-related information from the Internet (Lima-Pereira, Bermudez-Tamayo, & Jasienska, 2012). The current research will identify the use of the Internet by pregnant women in WA for the purpose of ascertaining if ANE via Webinars is a viable option in WA.

Education on PFME is freely available on the Internet. A study identified 22 videos relating to PFME housed on YouTube (Stephen & Cumming, 2012) which is a video sharing service that allows users to watch videos posted by other users and upload videos of their own (Anonymous, 2009). During the seven month course of this study, there was a median increase in viewing PFME videos on YouTube of 59.4%. The majority of viewers were aged between 35 and 64 years (Stephen & Cumming, 2012). However, these researchers and other researchers (Larsson, 2009; Lima-Pereira et al., 2012) expressed concern that the Internet users were unable to discern the quality of the information (Stephen & Cumming, 2012). These studies concluded that during visits to the antenatal clinic or local doctor, health care providers ought to consider providing links to verified websites (Larsson, 2009; Lima-Pereira et al., 2012; Stephen & Cumming, 2012). Therefore, in keeping with the stated aims of The Australian Health Informatics Council, it could be postulated that providing verified web-based information in the form of PFM education for pregnant women may potentially improving health outcomes by reducing PFM dysfunction.

A recent RCT (n = 250) in Sweden, compared two PFME treatment programmes for women with SUI (Sjostrom et al., 2013). One group of women was sent the intervention by post and the other group of women was sent the intervention by email. The intervention consisted of education on SUI and lifestyle factors, PFME and a training report to record the frequency and time spent doing PFME. For the web-based group the intervention could be downloaded and printed and participants were able to contact a continence specialist. The two primary objectives were measured using the International Consultation on Incontinence Questionnaire-Short Form and the International Consultation on Incontinence Questionnaire Lower Urinary Tract Symptoms Quality of Life Form. Results demonstrated significant levels of improvement in UI and quality of life for participants within both the web-based and postal groups but these significant levels of improvement were not demonstrated between web-based and postal groups. However, participants in the web-based treatment group reported that they had reduced the use of aids for UI and 84.4% of these participants reported the treatment programme as good or very good compared to 62.9% of participants in the postal group. Even though the participants were actively seeking treatment for SUI, the study concluded that the web-based intervention is a promising alternative treatment from interventions using face-to-face or printed information, although the study did not aim to compare the web-based intervention with the traditional face-to-face treatment for reducing SUI (Sjostrom et al., 2013).

A new web-based intervention which includes education on PFM and aims to encourage adherence to a PFME programme was recently introduced to the members of The Continence Foundation of Australia. The membership was informed that an Application for PFME use via mobile phones had been released. The free PFME Safe App contains three levels of workout catering for the different general fitness levels and PFM strength. The App features an instructional video, pictures on each exercise, PFME guide and links to useful web-sites (Continence Foundation of Australia, 2013) but the App has not been evaluated yet. An App used on personal electronic devices is possibly another avenue for increasing adherence and providing a reliable source of information to a prescribed treatment programme of PFME.

While studies that investigate the delivery of ANE and PFME through web-based education are limited, research from other areas of health support the premise that this form of education may be effective for promoting change in health behaviour relating to undertaking a PFME programme and the uptake of additional problem-solving strategies recommended during ANE. Other reviews of web-based health education have shown that it can be delivered efficiently and conveniently, for people with a range of educational backgrounds, by using various web-based technologies in different clinical settings (Brock & Smith, 2007). In the USA, a computer-based diabetes education programme was designed with the aim of improving knowledge about diabetes in a group of people who were classified as having low literacy. The programme was viewed once only by patients (n = 190) at diabetes clinics. The patient knowledge scores about diabetes increased significantly from baseline after participating in the education programme (Kandula et al., 2009).

Such education has been thought to be cost effective but a review of the economic evaluations of eight studies on Internet interventions reported that there was a lack of thorough cost-benefit analyses (Tate, Finkelstein, & Khavjou, 2009). However, in a recent Australian study, investigators concluded that web-based education was more cost-effective from the education provider's perspective than providing face-to-face contact (Maloney et al., 2012).

Disadvantages of web-based education includes social isolation, up-front costs and battling technical problems (Cook, 2007). While web-based delivery can overcome geography, mobility and time (Cook, 2007; Griffiths, Lindenmeyer, Powell, Lowe, & Thorogood, 2006), these advantages may not be a substitute for personal contact and overcoming the disadvantage of social isolation (Griffiths et al., 2006). Accordingly, use of the Internet for PFME should also be investigated using a RCT to evaluate the effect of web-based learning in ANE and education on PFM function and facilitation.

#### *Summary.*

There is limited research to support the best methods of providing ANE even though the research suggests that ANE classes are best facilitated using adult education strategies such as brainstorming, discussion and group activities, aimed at meeting the needs of the pregnant women as opposed to the educator talking about topics which they feel the women should learn. However, best practice guidelines recommend that all pregnant women attend ANE as an adjunct to antenatal care. Pelvic floor muscle education and the facilitation of PFME are recommended as an important part of ANE for all pregnant women. Since many women undertaking PFME are required to undertake a change in health behaviour, behaviour change theories such as HBM, SCT and TTM have been used in research that has designed and tested PFME interventions. The HBM has been used in continence research and has been shown to be an appropriate model used to design and deliver PFME programmes. Delivery of PFME has not been well tested using web-based interventions. However web-based interventions have the potential to be used increasingly for health education including in the area of ANE and PFME. Researchers in the area of web-based education have recommended that high quality RCT be conducted to evaluate whether web-based interventions can have a positive effect on changing health behaviours.

## 2.80 Discerned Gaps in Recent Research

This chapter has identified and critically reviewed the published research that is relevant to PFM and PFME during pregnancy. The gaps identified by this review will be discussed in the following paragraphs.

### 2.81 Gaps in antenatal education.

ANE is reported to be provided by PT and midwives and PFM information is frequently taught at these ANE classes. Physiotherapists are also involved in ANE to promote physiotherapy–related topics which includes the role of the PFM and PFME with the aim of maintaining optimal PFM function. Preventing PFM dysfunction during the antenatal period can assist to prevent and reduce UI and other problems associated with PFM dysfunction during pregnancy and later in life. Education on PFM and PFME during pregnancy is recommended to be taught by a health educator who specialises in continence.

Whilst guidelines recommend that pregnant women attend ANE as an adjunct to antenatal care (Banta, 2003), there is a lack of high quality evidence about the benefits of ANE with no consistent evaluation of the outcomes of attendance. There is a lack of evidence for the best method to deliver ANE. The knowledge gained about PFM function and anatomy; the change in confidence in and belief about engaging in PFME; and adherence to a PFME programme by pregnant women attending ANE has also not been evaluated.

There are women who choose not to attend ANE (Lee & Shorten, 1999; Tighe, 2010). Two reasons identified by primiparae women for non-attendance at ANE were the need for flexible availability of classes and increased promotion and advertising of ANE (Tighe, 2010). It has been noted that non-attenders at ANE are more likely to be women who have low levels of education or speak LOTE (Fabian et al., 2004, 2005). Research findings suggest that strategies need to be developed to assist with providing ANE for women with low literacy skills or who speak LOTE. In summary, further research is required to decide on the optimum strategies needed to increase pregnant women's knowledge about PFM and engagement in PFME during pregnancy.

### 2.82 Gaps in research investigating pelvic floor muscle education.

A review of RCT recommended a multi-faceted approach to education on PFM function and facilitation for pregnant women (Morkved, 2007). Current guidelines also recommend that pregnant women engage in PFME. There is limited published research that had measured the effectiveness of web-based PFM treatment for SUI (Sjostrom et al., 2013). Web-based education has been demonstrated to be effective in recent health research to overcome barriers of distance and isolation, provide social support, gain knowledge, confirm and reassure beliefs, support decision making and influence behaviour changes (Beranova & Sykes, 2007; Bernhardt & Felter, 2004; Cook, 2007; Murray et al., 2009) and assist with health education (Brock & Smith, 2007). However, web-based PFM education for pregnant women has not been evaluated. Another systematic review of health care interventions delivered over the Internet recommended that research compare web-based interventions with traditional models of treatment such as face-to-face treatment (Griffiths et al., 2006).

The Australian Health Minister's Advisory Council (2012) published guidelines of recommended health checks and educational topics for discussion during pregnancy. The aims of the guidelines are to provide care for pregnant women using evidence-based advice in the key areas of antenatal care. In the current recommended practice points in WA, education on PFM, PFME and continence are not listed (Australian Government Department of Health and Ageing, 2012, 2013). Therefore, absence of these data may form a gap in the translation of evidence into practice (Glasziou, 2005) as it is important that local area clinicians use current evidence about PFME and prevention of UI when they are treating their local populations.

### 2.83 Conceptual framework underpinning the design and evaluation of a web-based pelvic floor muscle education programme.

The conceptual framework for designing and evaluating the efficacy and feasibility of providing a web-based PFM education intervention for its effect on knowledge, awareness of PFM and engagement and adherence to a PFME programme among pregnant women is presented in Figure 2.4 and discussion of the concepts follow.

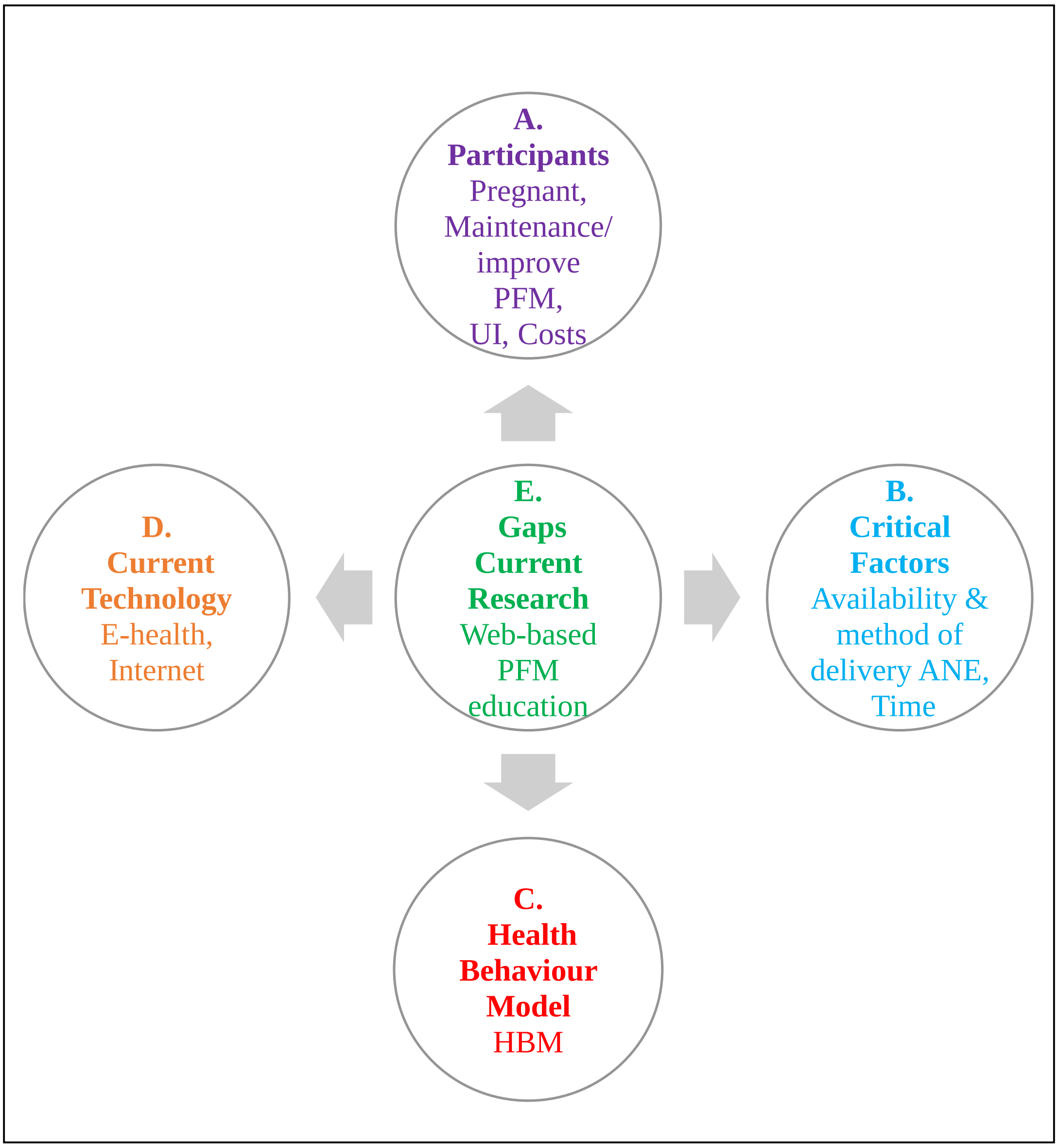



*Figure 2.4.* Conceptual framework for the research.

A. As discussed in Sections 2.11 to 2.40, during pregnancy it is important to maintain optimal PFM function, as being pregnant and delivering a baby are risk factors for developing PFM dysfunction and UI (Chiarelli & Brown, 1999; Handa et al., 2011). A combination of the physiological effects of pregnancy and mode of delivery are primarily responsible for the development of PFM dysfunction. Developing UI during pregnancy increases the risk of developing UI in the postnatal period and later in life (Viktrup et al., 2006) which is costly both socially and financially for the individual and health care systems (Deloitte, 2011). Therefore, it is important that pregnant women have the opportunity to learn about PFM and PFME, as PFME are the recommended first-line conservative treatment for UI (Dumoulin & Hay Smith, 2010). Education that is timely and accessible and can inform pregnant women about the structure and function of the PFM and optimal methods of correctly performing PFME to maintain or improve PFM function, may facilitate women to engage in a PFME programme. Web-based PFM education could have an emphasis on encouraging women who have UI to seek help from an appropriate health professional in a timely manner. Maintaining or improving PFM function can potentially reduce and prevent UI therefore maintain women's physical and mental quality of life and preventing associated health care costs.

B. Section 2.30 discussed the International Continence Society and NICE guidelines which recommend that all pregnant women receive education on PFM and PFME to maintain optimal function of the PFM which can reduce and prevent UI. Critical factors for attending ANE, which can be an important means of providing education on the function of PFM and facilitation of PFME, are the availability, method of delivery and time of classes. However, many women do not attend ANE (Fabian et al., 2004; Lee & Shorten, 1999; Tighe, 2010). Barriers identified as causing non-attendance at ANE include unsuitable class times; transport difficulties; or the women perceiving that they had sufficient information about pregnancy-related topics (Tighe, 2010). Being able to access the relevant PFM education on the Internet may be one strategy to overcome the barriers for non-attendance at ANE and resultant lack of exposure to PFM education.

C. Health behaviour change theories (Section 2.5) have been used successfully to design and deliver interventions that have promoted continence and adherence to a PFME programme (Alewijnse et al., 2001; Burgio et al., 1998; Chiarelli & Cockburn, 1999; Gillard & Shamley, 2010; Goode et al., 2003; Palmer, 2004) (Burgio et al., 2008). The HBM (Section 2.53) is a theoretical model of health behaviour change which conceptualises that social determinants such as SES, age and education, mediate beliefs, awareness and engagement in preventative health behaviour (Becker, Drachman, & Kirscht, 1974; Janz & Becker, 1984; Rosenstock, 1974a). The correlation between SES and attendance at ANE whereby women from low SES are less likely to attend ANE, has been observed in research conducted in ANE populations (Raleigh, Hussey, Seccombe, & Hallt, 2010; Tighe, 2010; Titaley, Dibley, & Roberts, 2010). New skills relevant to pregnancy, delivery and parenting may be learnt during ANE and this may include PFME. However if PFME have not been practised previously, then commencing a PFME programme will require a change in health behaviour by the pregnant woman. Consequently, the HBM is a relevant theory for application to the design of web-based PFM education intervention. In order to improve health outcomes, ongoing adherence to the newly learnt health behaviours relevant to that outcome is paramount. Researchers investigating the effects for a PFME programme on UI have strongly suggested that the lack of positive outcomes may be due to a lack of adherence to the PFME programme. Therefore, an intervention such as a web-based PFM education programme which may enhance adherence to a PFME programme is an important intervention to trial for its effect on adherence to PFME programme.

D. In 2008-09, 75% of households in Australia had Internet access, with 74% of Australians aged over 15 years having used the Internet in the previous 12 months (Australian Bureau of Statistics, 2011). In 2011, personal electronic devices such as smartphones and tablets outnumbered the sales of computers and 94% of Australians accessed the Internet (Bramwell, 2012). A study of the antenatal population found that 84% of pregnant women used the Internet to search for pregnancy-related information (Larsson, 2009). Web-based health education has been demonstrated to assist patients to gain knowledge, improve communication and support changes in behaviour in other areas of health, such as diabetes (Bernhardt & Felter, 2004; Kandula et al., 2009; Murray et al., 2009). However while there is a move towards e-health and an increasing use of web-based resources (Eysenbach, 2001; The Australian Health Informatics Education Council, 2011) there are difficulties for users of the Internet searching for evidence-based information and establishing which web-sites have evidence-based information (Larsson, 2009; Lima-Pereira et al., 2012; Stephen & Cumming, 2012). Therefore web-based PFM education designed using evidence-based principles may be a suitable means to inform and encourage women to engage in and adhere to a PFME programme.

E. There have been limited studies that have investigated (Sjostrom et al., 2013) whether PFM information can be delivered using a web-based mode. Consequently, opportunity exists for research to evaluate whether delivering web-based PFM education is feasible and can be an effective means for pregnant women to learn about PFM and engage in a PFME programme. The concepts of the HBM will also be incorporated into the evaluation of the intervention. The HBM has previously been successfully used to evaluate outcomes in the area of continence and will be applied to the measurement of outcomes in this research to assist in determining whether a web-based PFM education intervention may be a suitable means of providing education to inform and encourage primiparae women to become aware of and gain knowledge of PFM and enhance their confidence in and belief about engaging and adhering to a PFME programme.

In summary there is strong evidence supporting the role of education for improving awareness and knowledge about PFM and promoting uptake and engagement in PFME during the antenatal period. Engagement in PFME can assist to maintain optimal PFM function and reduce and prevent UI during the perinatal period. The current research recommends that a pregnant woman commence PFME at about 20 weeks' gestation at the level appropriate for the pregnant woman and increase to eight to 12, near maximal contractions, three times per day (Bo, 2007b; Morkved, 2007; National Collaborating Centre for Women's and Children's Health [UK], 2006) holding each contraction for three to 10 seconds (Bo & Aschehoug, 2007). The correct facilitation of the PFM is paramount to prevent PFM dysfunction, and individual sessions may be appropriate for some women. However, many pregnant women may not attend ANE or receive education on PFM and PFME. Therefore, alternative strategies are needed to encourage exposure of pregnancy-related education to all pregnant women and evidence-based and web-based PFM information may be a method of achieving this outcome.

### 2.84 Research questions.

Antenatal education is a method of informing pregnant women about pregnancy-related topics including PFME. Primiparae women may not attend ANE (Wilson et al., 2014) and perinatal women often have minimal contact with a PT (Hay-Smith, 2013). Their only involvement may be if they attend classes or seek a referral for individual treatment for a physical problem (Whitford et al., 2007a). Urinary incontinence is one of the most common and embarrassing problems encountered during pregnancy (Dolan et al., 2003; Morkved & Bo, 1999; S L Wesnes et al., 2007; Whitford et al., 2007a). Trials to evaluate strategies for the promotion of optimal PFM function and prevention of UI are recommended before UI occurs (Chiarelli & Brown, 1999; Chiarelli et al., 1999; Roberts et al., 1998). Providing PFM education encouraging adherence to PFME programme may maintain or improve PFM function and reduce or prevent UI during the perinatal period. There has been scant research conducted that has investigated whether PFME skills can be transferred during pregnancy via a web-based environment. If PFM and PFME education can be provided effectively using the Internet it may improve health outcomes related to PFM in the area of ANE.

The present research trial will develop and evaluate a novel intervention consisting of web-based PFM education which will be provided in addition to usual antenatal care. Web-based PFM education may be a suitable means to raise pregnant women's awareness and knowledge of PFM and PFME and encourage pregnant women to engage in and adhere to a PFME programme. A framework of the proposed research is shown in Figure 2.5 which demonstrates the relationship between the questions, data collection and the final documentation of results.

The specific questions addressed by this research are:

***Primary Research Questions.***

1. Can primiparae women gain awareness and knowledge of the function of the PFM and PFME through participating in a web-based PFM education programme?

2. Can primiparae women gain the confidence in and belief about engaging in PFME through participating in a web-based PFM education programme?

3. Can primiparae women adhere to a PFME programme that is delivered through web-based PFM education?

***Secondary Research Questions***.

4. What are the locations; number of women attending; qualifications of physiotherapists involved; allocation of physiotherapy hours; content of education; and strategies used to enhance learning in the ANE classes provided by PT employed in hospitals funded by the DOHWA?

5. What are pregnant women's levels of awareness and knowledge of PFM and PFME; self-reported engagement in PFME; and attendance at ANE?

6. What is the frequency of self-reported UI in pregnant women in WA?

7. Do pregnant women in WA use the Internet to search for pregnancy-related topics and if so which topics do they seek?

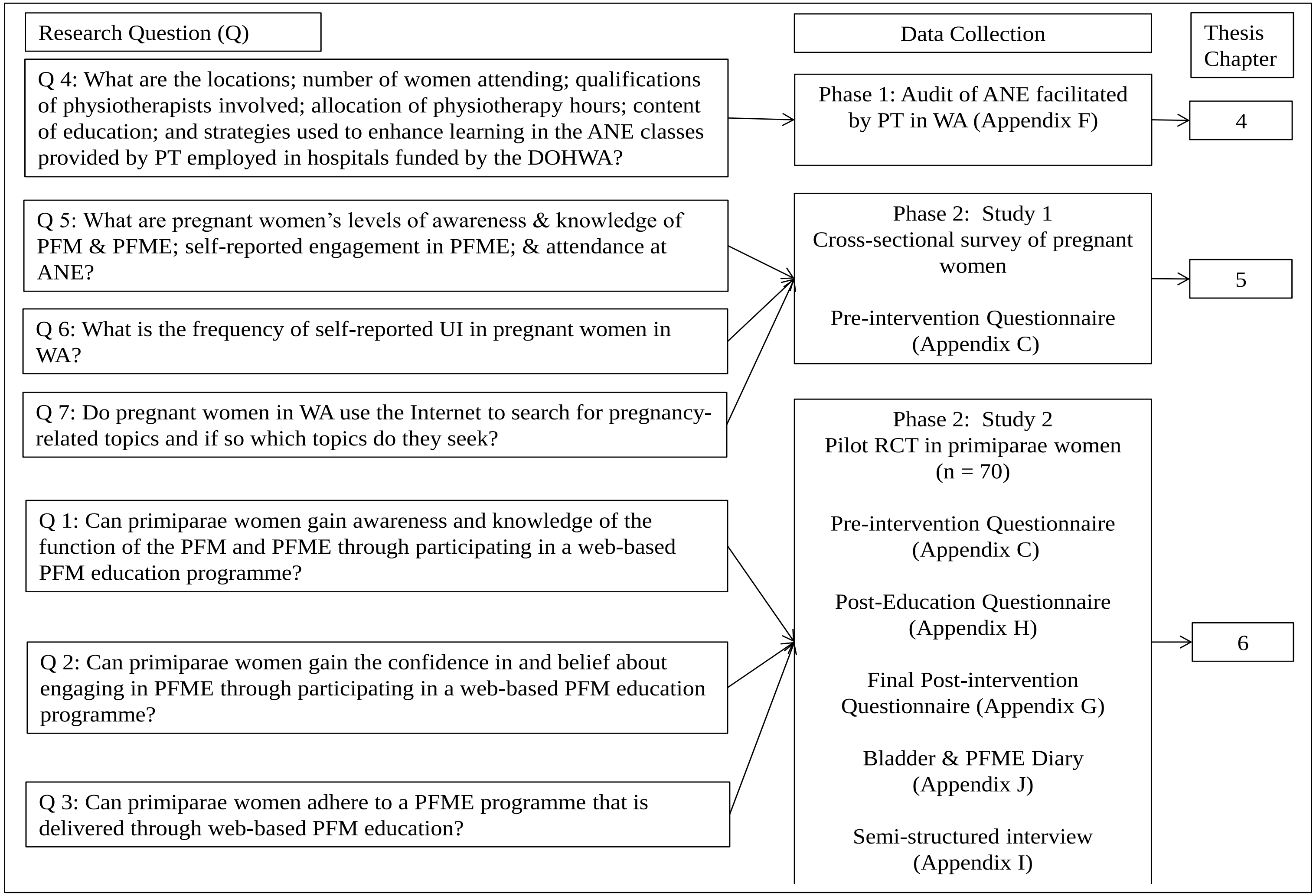



*Figure 2.5.* Structure of the research.

### 2.85 Aims of the research.

The primary aims of this research were to:

1. evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on awareness and knowledge of PFM and PFME compared to usual antenatal care alone;
2. evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on confidence in and belief about engaging in a PFME programme compared to usual antenatal care alone;
3. evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on adherence to a PFME programme compared to usual antenatal care alone.

The secondary aims were to:

4. identify the locations; number of women attending; qualifications of physiotherapists involved; allocation of physiotherapy hours; content of education; and strategies used to enhance learning in the ANE classes provided by PT employed in hospitals funded by the DOHWA;
5. evaluate pregnant women's awareness and knowledge about PFM and PFME; their self-reported engagement in PFME; and attendance at ANE;
6. evaluate the frequency of self-reported UI in pregnant women in WA;
7. evaluate pregnant women's usage of the Internet regarding pregnancy-related topics.

# CHAPTER 3

## Research Environment

### 3.10 Design

The research design is presented in Figure 3.1 and demonstrates the relationship between the two phases, randomisation and data collection. The research was conducted in two Phases and was undertaken in WA. Phase 1 consisted of a cross-sectional survey which was an audit of ANE facilitated by PT employed in public hospitals. Phase 2 consisted of a large cross-sectional survey of pregnant women (Study 1) which was followed by a pilot RCT (Study 2). The cross-sectional surveys conducted in Phases 1 and 2 of this research consisted of closed and open items and the data collection was quantitative. The pilot RCT used a convergent parallel mixed methods design where the quantitative data from the three questionnaires and the diaries were merged with the qualitative data from the semi-structured interviews (Creswell & Plano Clark, 2007). The collection of qualitative data enabled the voices of the pregnant women to be heard and also allowed the researcher to use multiple tools to collect data for the purpose of later triangulation (Creswell & Plano Clark, 2011). The combination and triangulation of multiple data sets in the design aimed to overcome any bias that could occur from using single-methods to examine the effect of this novel intervention (Grbich, 2013). Table 3.1 shows the integration of components applied to the research.

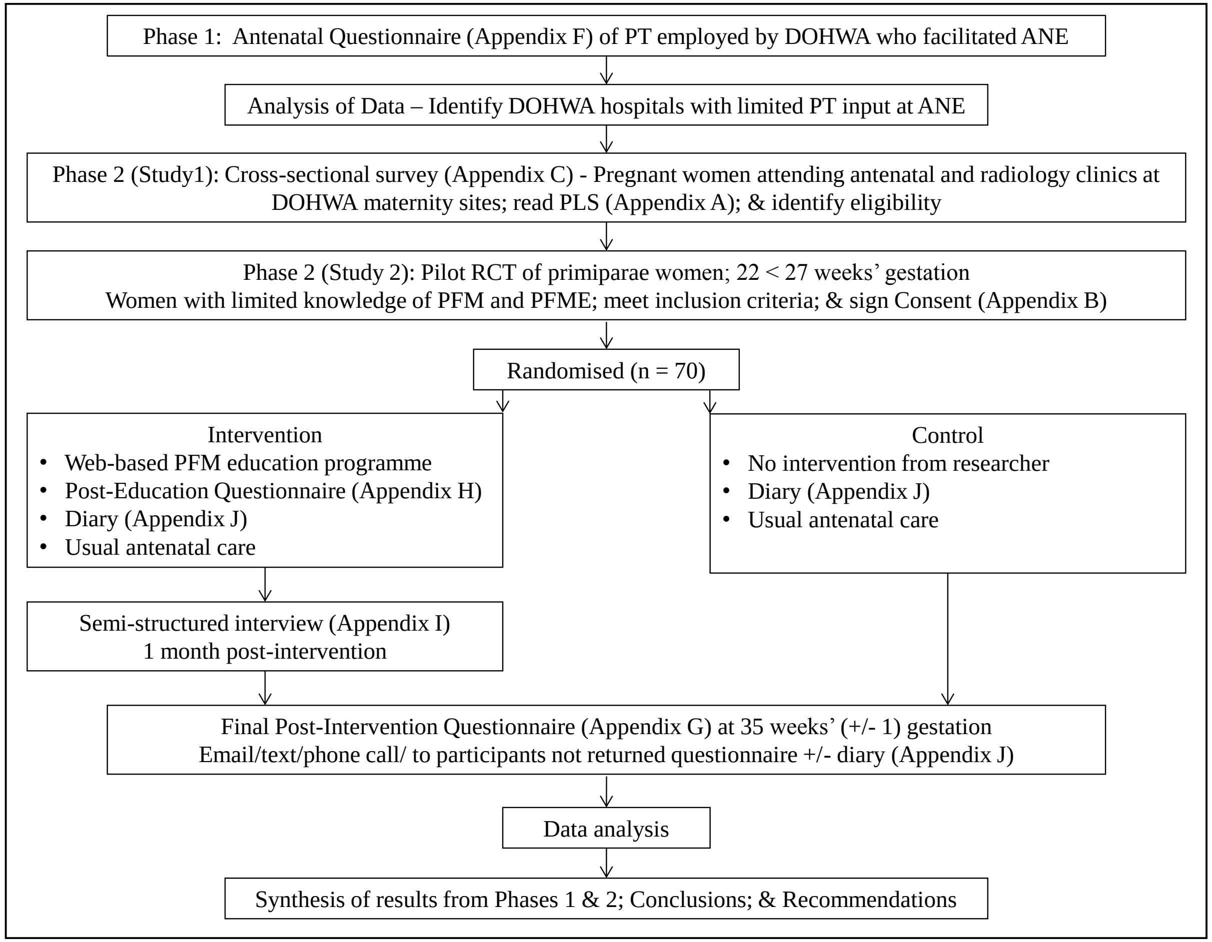



*Figure 3.1*. Design of the research.

Table 3.1.

*Overview of Components Applied to the Research*

| | Study | | |
|---|---|---|---|
| | Phase 1 | Phase 2 (Study 1) | Phase 2 (Study 2) |
| Title | Audit of ANE facilitated by PT in WA public hospitals | Survey of pregnant women in WA to evaluate knowledge, beliefs about and engagement in PFME | Evaluating the effect of web-based PFM education: Pilot RCT |
| Design | Online cross-sectional survey | Online or paper cross-sectional survey | Pilot RCT using surveys, diaries and interviews |
| Participants | PT who facilitate ANE | Pregnant women | Primiparae women<br>22 – 27 weeks' gestation |
| Sample size | 31 | 633 | 70 |
| Intervention | | | ✓ |
| Statistical analysis | | | |
| Quantitative | ✓ | ✓ | ✓ |
| Qualitative | | | ✓ |

### 3.20 Ethical Considerations

The ethical principles taken into consideration during both Phases of the research were based on the recommendations of the NMHRC Australia (National Health and Medical Research Council, Australian Research Council, & Australian Vice-Chancellors' Committee, 2007). To undertake Phase 1 of the research low risk ethics' approval was granted by the Human Research Ethics Committees (HREC) of The University of Notre Dame Australia, King Edward Memorial Hospital, North Metropolitan Health Service (NMHS), South Metropolitan Health Service (SMHS) and The WA Country Health Service. Phase 2 of the study was conducted in a population of pregnant women, therefore a high risk ethics application was submitted to the HREC. Ethics' approval was granted by the HREC from The University of Notre Dame Australia, NMHS, SMHS and The WA Country Health Service. The pilot RCT completed as part of Phase 2 was registered with the Australian New Zealand Clinical Trials Registry; ACTRN12613000192785 on 18$^{th}$ February 2013 (NHMRC, 2007). Table 3.2 documents the HREC and the registration numbers allocated to the submissions for both Phases 1 and 2 of the research. The Plain language Statement (PLS) is Appendix A and the form for informed consent is Appendix B.

Table 3.2.

*Human Research Ethics Committees and Registration Numbers of the Submissions*

| HREC | Registration number |
|---|---|
| Phase 1 | |
| The University of Notre Dame Australia | 01234F |
| King Edward Memorial Hospital | Quality Activity 4050 |
| North Metropolitan Health Service | 2012-044 |
| South Metropolitan Health Service | S/12/296 |
| Western Australia Country Health Service | 2012:09 |
| Phase 2 | |
| The University of Notre Dame Australia | 012114F |
| North Metropolitan Health Service | 2013-043 |
| South Metropolitan Health Service | 13/5 |
| Western Australia Country Health Service | 2012:44 |
| Australian New Zealand Clinical Trials Registry | ACTRN12613000192785 |

*Note.* For Phase 2 of the research, concurrent site approval was granted by Swan Kalamunda Health Service in the NMHS; Bentley Health Service and Rockingham Health Service in the SMHS; and all the health sites in the WA Country Health Service.

### 3.30 Setting.

The research for Phases 1 and 2 was conducted in the state of WA, which has an area of approximately 2.5 million square kilometres and is one third of the land area of Australia. The DOHWA health regions are shown in Figure 3.2. There are nine health regions in WA of which seven are in rural areas. Perth consists of two metropolitan health regions, the NMHS and the SMHS which includes the Peel Health Area (Western Australian Regions, 2012).

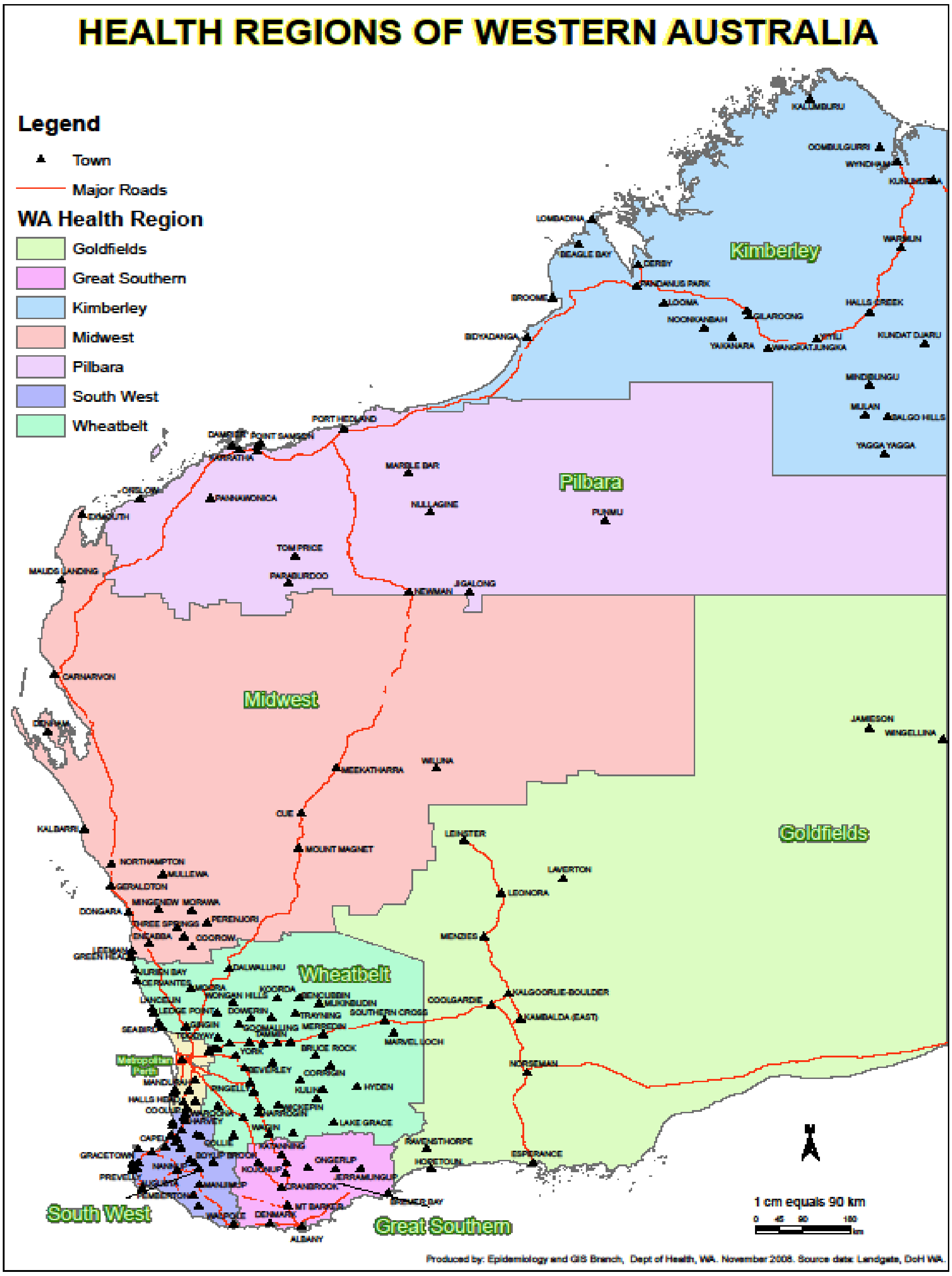



*Figure 3.2.* Map of the health service regions of Western Australia. Available from Western Australian Regions. (2012). Health Regions of Western Australia Retrieved 01 November, 2012, from www.itriagehealth.com.

Across WA, babies are delivered in 31 rural and metropolitan hospitals funded by the DOHWA and health professionals employed by the DOHWA hospitals deliver pregnancy-related education either in classes or during clinic appointments. In 2010 there were 30,843 deliveries reported in WA and 13,077 (42.4%) of these women were giving birth for the first time (Joyce & Hutchinson, 2012). The PT for Phase 1 were recruited from 31 DOHWA health sites with maternity services. The women for Phase 2 who were recruited by face-to-face contact were from seven DOHWA health sites, as shown in, Table 3.3. The large geographical area in WA and receipt of ethical approval were two reasons that surveys were collected from the seven DOHWA health sites although women attending these hospitals do not necessarily live in the Health Region in which the hospital is located. One such reason this may occur is the maternity services at these health sites have shared care with the sole public tertiary hospital for obstetrics in Perth, where women at medical high-risk attend for delivery. An additional reason is some women plan to deliver near family who may live in a different Health Region from the pregnant woman. Women attending the clinics receive shared care with midwives, GP and obstetricians. Referrals to PT may be implemented as appropriate for specific physical issues such as, incontinence, overactive PFM or back pain.

Table 3.3.

*Public Health Sites where Pregnant Women were Recruited by Researcher*

| Health service | Obstetric beds | ANE | Physiotherapy involvement | Health region |
|---|---|---|---|---|
| Bentley Health Service | 23 | Yes | Yes | SMHS |
| Bunbury Hospital | 10 | | No | South West |
| Busselton Hospital | 6 | | No | South West |
| Geraldton Hospital | 8 | Yes | Yes | Midwest |
| Nickol Bay Hospital (Karratha) | 7 | Yes | Yes | Pilbara |
| Rockingham General Hospital | 20 | Yes | No | SMHS |
| Swan District Hospital | 17 | Yes | Part-time | NMHS |

**3.40 Selection Criteria for Participants**

In Phase 1, physiotherapy managers employed at all hospitals that were funded by the DOHWA with maternity services were eligible for inclusion in the study. For Phase 2, all pregnant women, over the age of 18 years, were eligible to participate in Study 1. The inclusion and exclusion criteria for selection of participants into the pilot RCT conducted as part of Phase 2 were:

Inclusion criteria:

- Fewer than 27 weeks' gestation at the time of return of the cross-sectional survey (Appendix C). In a systematic review of three RCT, which prescribed PFME in the antenatal period, the PFME were commenced at 20 weeks' gestation. There was no recommendation made about a specific time during gestation for commencement of PFME (Joanna Briggs Institute, 2006). The NICE guidelines and International Continence Society recommends education on the importance of PFM and the value of performing PFME correctly should be available prior to or in early pregnancy but there was no recommendation made about a specific time during gestation (Abrams et al., 2010; Ismail, 2009; National Collaborating Centre for Women's and Children's Health [UK], 2006).

- Aged over 18 years.
- Able to speak and read English. As this was a questionnaire in English, in order to interpret and answer the questions correctly, the participant must speak English as a first language at home or have demonstrated a proficient verbal level of English when completing the survey and be able to understand the PLS (Appendix A) and consent form.

Exclusion criteria:

- Able to answer all the questions on PFM anatomy and function correctly. Women who had complete awareness and knowledge of PFM and PFME were ineligible to enrol in the trial as this research measured the change in knowledge levels that occurred after delivery of a web-based PFM education programme.
- Diagnosed with a neurological condition, for example, multiple sclerosis or a cerebrovascular accident. These medical conditions can affect the ability to voluntarily contract the PFM which is a pre-requisite for the web-based PFM education programme to be successful (Paddison, 2002).
- Advised to rest by a doctor. The questionnaire included items on the ability to undertake PFME whilst doing housework or carrying out daily tasks. Pregnant women assigned to bed rest would have been advised not to undertake household tasks and therefore would be unable to answer the final questionnaire accurately.
- Were unable to provide written informed consent.

## 3.50 Recruitment

### 3.51 Recruitment of physiotherapists for Phase 1.

In order to establish which hospitals had maternity services and were therefore eligible to be included in the recruitment phase, a list of all hospitals in WA with maternity centres and the telephone numbers was sourced from the Internet. The list also stipulated which hospitals were funded by the DOHWA and which were privately funded. From the list it was possible to ring the DOHWA hospitals and request to speak to the managers of the physiotherapy departments. The researcher was then able to send an email to the relevant manager to invite them to take part in the study.

### 3.52 Recruitment of pregnant women for Phase 2.

Preliminary face-to-face consultation and conversations by telephone with staff working in antenatal clinics in DOHWA hospitals with maternity services, revealed that many women attended either the antenatal clinic at, or prior to, 24 weeks' gestation and had a radiological scan at a radiological clinic when they were between 12 and 20 weeks' gestation. The researcher subsequently visited antenatal and radiological clinics.

#### *Print distribution.*

All pregnant women attending the clinic were greeted, advised of the researcher's qualifications, purpose of the visit and women over 18 years of age were invited to participate in Phase 2 of the research. The eligible women were provided with the PLS (Appendix A) and given the opportunity to ask questions prior to being requested to complete the Pre-Intervention Questionnaire (Appendix C). An affirmative response to item one gave consent for the survey information to be used. Woman who were nulliparous and less than 22 weeks' gestation received a brief verbal outline of Phase 2, namely the pilot RCT. An invitation was issued to provide their contact details so that they may be contacted to participate in the trial once their data had been analysed and met the inclusion criteria. Women who did not have time to finish the survey were given the choice of returning the survey in a reply paid envelope or completing the survey electronically, as described in the following section. A follow up phone call has been recommended as surveys tend to have a low rate of response (Alewijnse, Mesters, et al., 2003; Portney & Watkins, 2009). Accordingly a follow up phone call, email or text was implemented to encourage women to complete the questionnaire.

Private ultrasound clinics and GP were also approached to distribute surveys in reply paid envelopes. The surveys were either posted or delivered to the private clinic by the researcher and it was arranged to have them handed by the clinic receptionist to women upon arrival.

***Electronic distribution.***

There were women attending the clinics who did not have time to complete the questionnaire prior to their appointment. The researcher requested that the women write their email address and telephone number on the questionnaire so the researcher could contact them in the following days. Knowledge of the email address allowed the researcher to email the questionnaire, using an online software tool called "Survey Monkey", to the women for completion. Survey Monkey was also used to recruit women by snowballing from participants' friends and colleagues. The PLS (Appendix A) about the study was available online and consent was indicated by answering the questionnaire and filling in the telephone number and email address.

Facebook is a social networking website that is open to anyone to create and customise their own profiles with photos, videos and information (Anonymous, 2009). A site was set up on Facebook, with links to free pregnancy-related web-sites, to encourage women to partake in the research. The link to Survey Monkey and PLS (Appendix A) was included on the Facebook page.

Recruitment for the pilot RCT occurred between May 2013 and February 2014 using the Pre-Intervention Questionnaire (Appendix C) as the baseline questionnaire for the study. Women who provided written consent (Appendix B) at the clinics were enrolled immediately in the pilot RCT. Women who answered the baseline questionnaire electronically as part of the cross-sectional survey provided consent to be enrolled in the pilot RCT by completing item 33 and providing their contact details. After enrolment and randomisation the participants in both groups received an email [intervention group (Appendix D); control group (Appendix E)] and participants in both groups received the participant diary (Appendix J) with instructions on how it was to be completed.

## 3.60 Intervention - The Web-Based Pelvic Floor Muscle Education Programme

The web-based PFM education programme consisted of written instructions sent by email (Appendix D) with an online link to a programme which consisted of a web-based PFM education video (Appendix L for USB); dialogue on anatomy and function of the PFM including education on PFME (Appendix M); PFME "tips" sheet in portable document format (PDF) (Appendix K); and an electronic Post-Education Questionnaire (Appendix H). The semi-structured interviews (Appendix I) were implemented one month after the participants had viewed the education programme. The development of the electronic Post-Education Questionnaire (Appendix H) is described in Chapter 6 (Section 6.24).

### *The web-based pelvic floor muscle education video.*

The learning outcomes to be achieved from watching the web-based PFM education video were to:

- develop awareness of the significance of PFM and PFME - why it is important to do PFME during pregnancy;
- understand the basic anatomy of the PFM – where the PFM are located;
- understand the function of the PFM – what the PFM do;
- learn how to facilitate PFM correctly – develop confidence in and belief about engagement in PFME during pregnancy;
- seek help, when required - learn where to source further information on the function and facilitation of PFM and symptoms of UI during pregnancy from PT or alternative sources such as health professionals, books or the Internet;
- provide a user-friendly and convenient form of PFM education which is cost effective – free;
- provide a "snap shot" of evidence-based PFM education to pregnant women who may otherwise not have accessed this information.

The web-based PFM education programme was not designed to provide treatment for UI but was intended to provide education on PFM and encourage participation in a PFME programme.

The development of the video segment of the intervention began by reviewing other PFM videos presented by health professionals on YouTube (Continence Foundation of Australia, 2010; NHS, 2010a); reviewing the information taught at ANE (Wilson et al., 2014) and reviewing the current literature described in Chapter 2 (Sections 2.30) (Morkved, 2007). This review was undertaken to identify the learning outcomes of PFM education and the methods by which the unique concepts, words and graphics are used to convey the PFM information to the viewers. Simple design concepts and text were then used to develop the web-based PFM education video to meet the required learning outcomes. The information on the PFM and the frequency of repetition of contractions for the PFME programme are based on the current recommended guidelines for pregnant women (Morkved, 2007). The quality of the PFM contraction was not assessed.

Evidence suggests (Chapter 2, Section 2.51) that any programmes designed for pregnant women should be designed keeping the principles of adult learning in mind (Tighe, 2010). Accordingly, this web-based PFM education programme was designed with these principles in mind. The overarching design was for the video to be divergent - using alternative positions for practicing PFME; assimilative - following a logical sequence with evidence-based information; convergent - focusing on the maintenance or improvement of PFM function and preventing or reducing PFM dysfunction; and accommodative - practicing the new technique of PFME and where to find more assistance and information if required (Kolb, 1984; Merriam & Bierema, 2014; Thurber, 2003). Accordingly, the five minute web-based PFM education video in the present research used some of these design strategies.

Successful strategies used in web-based education, discussed in Chapter 2 (Section 2.70), were incorporated into the design of the video. The video was one source of information delivered in a multimodal format. To meet the learning outcomes, on-screen text, graphics, animation, teaching aids and spoken dialogues were designed to teach the information using images that would facilitate and assist participants to understand, remember and practise the key concepts. The specific design concepts of the web-based programme related to education on the function and facilitation of PFM included arrows and moving parts to show the PFM upward movement and an image of the upward movement of the PFM on real-time ultrasound. The teaching aids were posters and a pelvis showing the attachments of the PFM. Hand placement, on transversus abdominis for example, was also used to demonstrate and reinforce important points and encourage the participants to participate in practicing PFME. Participants were encouraged to learn the PFME in a sitting position and increase the complexity by involving movement which also helps scaffold the task. Brief on-screen text corresponded to and reinforced the presented concepts, for example, the number of repetitions of PFME and relaxed upper tummy muscles. Participants were encouraged to practise PFME and concentrate and feel that their upper abdominal muscles (relax) and lower abdominal muscles (contract) whilst keeping their accessory muscles (legs and bottom) relaxed. Prompts were suggested to encourage the participants to practise the PFME and adhere to a PFME programme.

The design included the implementation of teaching strategies such as, use of plain language; organisation of the information in a logical order; structuring the information in understandable chunks; defined technical terms; and use of the active voice. The information was also designed with attention to literacy, graphics, text, motivation for learning and the cultural appropriateness of the materials (Hardin & Reis, 1997; Kandula et al., 2009; van Merrienboer & Sweller, 2012). Furthermore, adult learning styles (Knowles, 1970; Kolb, 1984) were also considered in that the sound catered for aural learners, whilst the movement and writing catered for visual learners and the practise of PFME catered for kinaesthetic learners (Mainemelis et al., 2002; Neufeld, 2006).

The content of the intervention was based on the concepts of preventative health behaviour which can be conceptualised and explained using the HBM (Rosenstock, 1974a). Figure 3.3 indicates the researcher's concept of the application of the constructs of the HBM applied to the PFM education intervention that promoted the desired health behaviour of acquiring knowledge on PFM and performing PFME. Using the HBM to design this novel intervention for educating pregnant women applied the theory of health behaviour as a means of producing a health behaviour change in pregnant women.

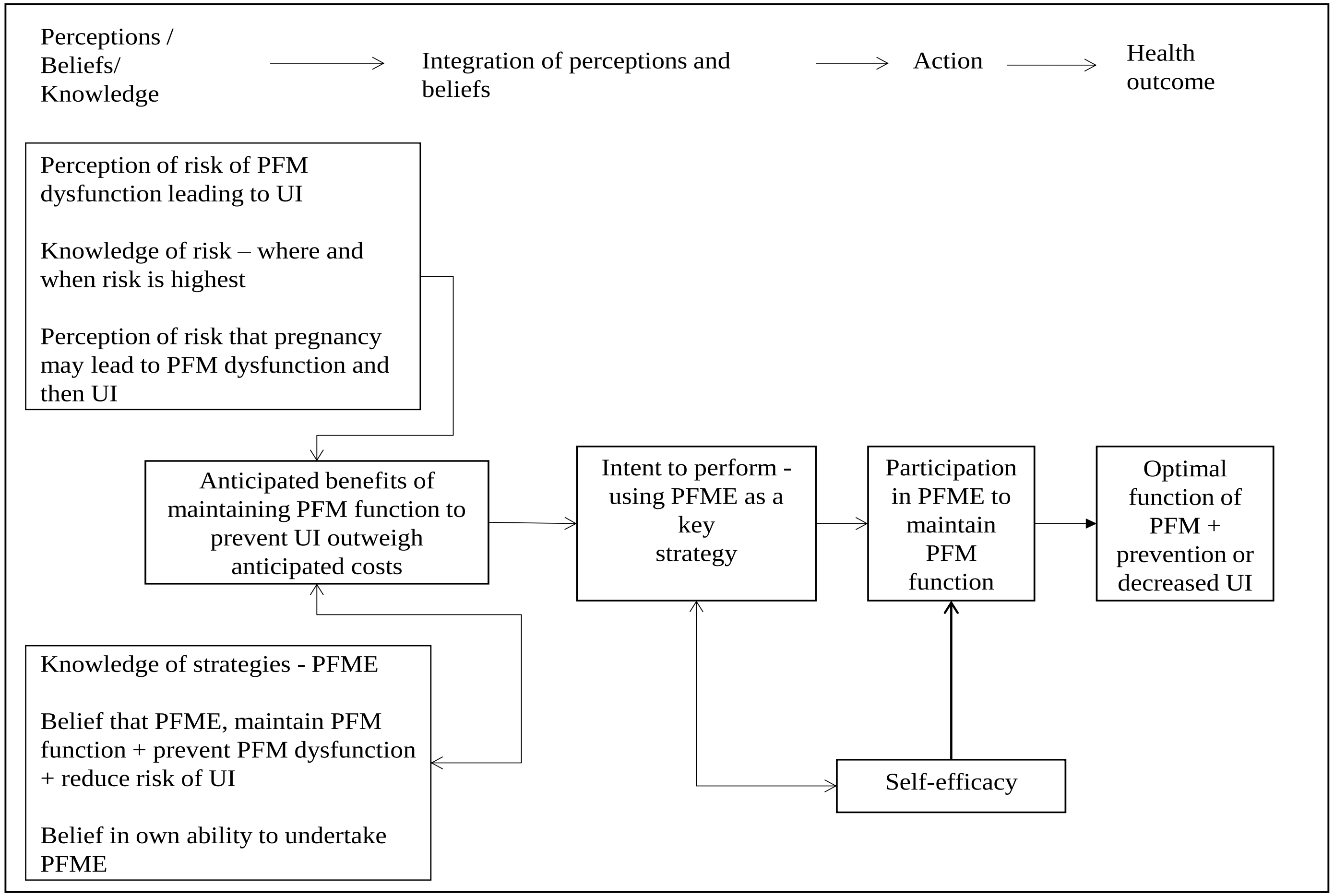



*Figure 3.3*. Diagram representing the constructs of the Health Belief Model (Becker et al., 1974; Rosenstock, 1974b; Rosenstock, Strecher, & Becker, 1988) applied to the health behaviour of engaging in pelvic floor muscle exercises.

The content of the video was scripted and designed by the primary researcher, a PT, who specialised in Continence and Women's Health and had experience in facilitating ANE classes. The focus was on communicating the information succinctly and without unnecessary vocabulary. The video was produced, edited and cropped by a private film-maker who recommended the role of the PT in the video was played by an actor. An actor is trained to deliver information using the active voice, maintain eye contact, learn the script and apply appropriate make-up which may better assist with meeting the learning outcomes. Implementing this advice an actress was paid to role-play the PT after being carefully instructed on what was required. The actress observed the researcher describing the anatomy of PFM and facilitating PFME prior to filming. The role of the pregnant woman in the video was played by a volunteer who was primipara at 22 weeks' gestation. This was to ensure that the video portrayed an authentic performance by a pregnant women whose knowledge of PFM and PFME was limited. The dialogues (Appendix M) were learnt scripts in English and presented by the actress playing the PT and the volunteer playing the pregnant woman. The words were spoken verbatim, the manner of speech followed recommended oral communication (Vicary & McKenna, 2006), and was spoken at a moderate pace with no breaks. The sound could be altered to compensate for anyone who was hearing impaired. The filming took four hours and the researcher and film maker consulted on three occasions, after completion of filming, to edit the video and add text.

The duration of the video was five minutes in length and was uploaded to YouTube for private viewing. A link was emailed (Appendix D) to the participants in the intervention group which could be filed electronically and accessed at a time that was convenient to them. [The video can be accessed and viewed by following this link or pasting the following link into YouTube, http://youtu.be/3Gz5tYxZ5fo and a copy is supplied on a USB (Appendix L) with this thesis].

***The "tips" sheet.***

Accompanying the video was a "tips" sheet, in PDF format (Appendix K), designed as an adjunct to reinforce the education video which could be electronically stored or printed and displayed in a prominent position for immediate reference. When printed, the "tips" sheet was one A4 page with text and graphics in contrasting colours to highlight the important points. The "tips" sheet included contact details for the researcher and principal supervisor and was divided into three sections A, B and C.

Section A, titled PFME, highlighted three important points to remember when practicing PFME correctly. Section B directed participants to recommended websites which contained evidence-based information on PFM, PFME, continence and in LOTE (Continence Foundation of Australia, 2012a, 2012b; O'Dwyer, 2011). These websites were chosen because information that could be found on them was designed in conjunction with health care professionals and based on recent evidence-based research. Section C provided information on how and where to seek help locally if participants wished for more information on PFME or to seek assistance for the symptoms of UI.

### 3.70 Outcome Measures

The outcomes measured in Phase 1 by using the Antenatal Education Questionnaire (Appendix F) were:

- number and locations of ANE facilitated by PT;
- number of hours of ANE offered in a particular hospital/health centre;
- number and topics taught by PT;
- number of adult education strategies used to facilitate ANE;
- number and location of PT who facilitated education on PFM and PFME.

An overview of the OM for Phase 2 are presented in Table 3.4 including OM, data collection instruments and the relevant item numbers in the questionnaires. The cross-sectional survey (Study 1), was conducted using a questionnaire (Appendix C). The OM for the pilot RCT (Study 2) were also measured with questionnaires (Appendices C, G and H) which were administered pre- and post-intervention, participant diaries and semi-structured interviews. The OM are described in more detail in Chapters 5 and 6.

Table 3.4.

*Outcome Measures, Data Collection Instruments and Item Numbers*

| Level of outcome measure | Measurement instrument | Item Baseline[a] | Item Follow-up[b] |
|---|---|---|---|
| Primary | | | |
| Awareness of PFM | Questionnaires | 5 - 7 | 41 |
| Knowledge of PFM | Questionnaires | 8 - 12, 14 | 1<br>9 – 23, 25 |
| Confidence in and belief about engaging in PFME | Questionnaires | 18 – 26 | 28 – 33, 40 |
| Adherence to PFME programme | Questionnaire<br>Diary[c] | | 18, 34 – 37, 39 |
| Strategies used to adhere to PFME | Interview[d] | | 38 |
| Secondary | | | |
| Self-reported UI | Questionnaire<br>Diary | 13 | 24 |
| Knowledge of available treatment for UI | Questionnaires | 15 - 17 | 26 |
| Attendance at ANE | Questionnaires | 2, 3 | 10, 11 |
| Web-based ANE | Questionnaire | 4 | |
| Usage of Internet for pregnancy-related topics | Questionnaires | 4, 28, 29 | 6, 7, 8, 12 - 17 |

[a]Appendix C, Pre-Intervention Questionnaire

[b]Appendix G, Final Post–Intervention Questionnaire

[c]Appendix J, Diary

[d]Appendix I, Semi-structured interviews by telephone

Additional measures for Phase 2 completed at baseline were demographics of participants, including self-reported smoking habits and amenability to attend web-based ANE. Measures taken at baseline and follow-up were medical conditions of participants, self-reported general exercise, access to physiotherapy services and a measure taken at follow-up only was whether participants accessed services for UI.

## 3.80 Data Collection Instruments

The research used surveys, diaries and semi-structured interviews for data collection. This section describes these data collection instruments and the reasons why they were chosen. Figure 3.1 in the present chapter identifies which instruments were used for each phase of the data collection.

### 3.81 Survey research.

Survey research was used in both Phases 1 and 2 of the research and was chosen because respondents were geographically distant from the researcher and there were multiple sites and collections of data. There were no specifically relevant and validated questionnaires available to obtain the data required for either phase of the present research. The questionnaires were therefore developed on the basis of collecting quantitative data identified as important to evaluate the effect of the web-based education programme and measure the other outcomes. An extensive literature review identified questions used by researchers. The survey items were adapted from British, European and Australian research papers as the characteristics of the health systems and behaviours of the populations are similar. Designing a survey based on previous relevant research is a strategy recommended by Portney and Watkins (2009) who suggest that adapting items from previous research is superior to developing entirely new items. The use of items from research papers assures that relevant topics are covered (Hicks, 2004). The survey items in the current research used simple wording and were grouped in a logical order to make it easier for the respondents to follow a theme. The questionnaires consisted of a mixture of open and closed items as recommended in the literature (Hicks, 2004; Portney & Watkins, 2009).

#### *Survey research Phase 1.*

The format for the Antenatal Education Questionnaire (Appendix F) was a one-off electronic questionnaire which was used as an exploratory audit to document the scope of ANE faciltiated by PT in WA. The majority of the questions required a closed response (Polgar & Thomas, 2008) but allowed for additional comments at the end of the questionnaire. The items contained in this questionnaire and validation of the items is presented in Chapter 4 (Section 4.30).

***Survey research Phase 2.***

Phase 2 used three cross-sectional surveys. The three questionnaires (Appendices C, G and H), were designed primarily to collect information from pregnant women on their awareness, knowledge and beliefs of PFM and PFME based on items from previous research (Alewijnse et al., 2001; Alewijnse, Metsemakers, et al., 2003; Chen, 2004; Fine et al., 2007; Gillard & Shamley, 2010). Items were also designed to elucidate information on ANE, UI and use of the Internet for pregnancy-related topics (Chiarelli & Brown, 1999; Sampselle et al., 1998; Whitford et al., 2007b). Full details of the Pre-Intervention Questionnaire (Appendix C) are provided in Section 3.90 and Chapter 5 (Section 5.12 for relationship of items with OM). The Final Post–Intervention Questionnaire and the Post–Education Questionnaire (Appendices G and H) are detailed in Chapter 6 (Section 6.24).

### 3.82 Semi-structured interviews.

Semi-structured interviews (Appendix I) were conducted by telephone to explore outcomes relevant to the delivery of the intervention tested in the pilot RCT. The researcher conducted the interviews and took notes. The purpose of writing notes was to document the interviews, record conversations, impressions, and generate analysable data. The notes were chronological, behavioural, descriptive and concrete (C S Carpenter & Suto, 2008; Gomm, Needham, & Bullman, 2000; Pope, Ziebland, & Mays, 2006). The procedure for the semi-structured interviews will be presented in full in Chapter 6 (Sections 6.24 and 6.26.2).

### 3.83 Participant diaries.

A participant diary (Appendix J) was used to collect data that measured adherence to PFME and frequency of UI. The procedure for using the diary is presented in Chapter 6 (Section 6.24).

## 3.90 Procedure for Recruitment of Pregnant Women

The procedure for Phase 1 is described in Chapter 4. Phase 2 commenced with the piloting of the questionnaires. The Pre-Intervention and Final Post – Intervention Questionnaires (Appendices C and G) for Phase 2 were sent to three Continence and Women's Health Physiotherapists who were asked to answer and appraise the questions (Peat, Mellis, Williams, & Xuan, 2002; Portney & Watkins, 2009). The questionnaires were also assessed for content validity by pregnant women attending an ANE class. The questionnaires and intervention protocols were then piloted (Portney & Watkins, 2009), on 10 pregnant women to ensure any ambiguities and sensitivities had been excluded (Hicks, 2004), to identify how long the questionnaires took to answer and to ensure the video could be viewed by the women. Feedback was analysed and wording in some items were altered to allow for a clearer understanding of the questionnaires. Such a procedure improved the face and content validity of the questionnaires which were then re-piloted until finalised (Peat et al., 2002). The data collection methods were piloted at the same time to allow necessary changes and ensure the collection procedure ran smoothly (Peat et al., 2002; Portney & Watkins, 2009). The antenatal cross-sectional survey was then conducted and participants were recruited as described in Section 3.50. Subsequent to completing the survey all women who provided informed consent (Appendix B) at the clinics were enrolled immediately in the pilot RCT. The procedure for the pilot RCT including randomisation of participants is described in Chapter 6.

#### 3.91 Statistical analysis.

The overall approach to the statistical analyses is described below and analyses specific to each study are described in detail in Chapters 4, 5 and 6. Statistical tables are presented without identification of the participants or health sites. Correlations noted in survey results in Chapters 4, 5 and 6 were compared to the current evidence-based research discussed in Chapter 2. Answers to survey questions were entered on a spreadsheet in Microsoft Office Excel (2007) and then transferred into IBM-SPSS (Field, 2009).

#### 3.92 Quantitative data.

Quantitative data obtained from Phases 1 and 2 of the research were summarised using descriptive statistics. Continuous variables from the questionnaires (age, gestation) were described using means and standard deviations. Categorical variables (parity, BMI, marital status, receipt of government assistance, employment, level of education, nationality, country of birth, language spoken at home, self-reported smoking, medical conditions, attendance at ANE, self-reported UI, treatment for UI, self-reported general exercise, awareness and knowledge about

PFM, confidence in and belief about engaging in PFME, self-reported use of the Internet and consultation with PT) were described using numbers, medians and interquartile ranges. Frequencies of responses were converted to percentages of total data and when presenting descriptive statistics, numbers and percentages were rounded to the nearest first decimal point. Statistical significance was defined as a 2-sided alpha of .05. The *p*-value was rounded to the third decimal point unless it was less than .001 in which case it was reported as $< .001$ (American Psychological Association, 2012).

In order to calculate the SES of the respondents, an instrument called Socio-Economic Indexes for Areas (SEIFA), developed by the Australian Bureau of Statistics, was utilised (Pink, 2013). This instrument ranks the geographical areas according to the socio-economic disadvantage or advantage. The SEIFA data were based on a summary of the Census variables from 2011. The variables included income, education, employment, occupation, housing and indicators of advantage and disadvantage. The SEIFA is an indication of the collective socio-economic characteristics of the people living in an area and is not assigned to individuals.

SEIFA data includes an Index of Relative Socio-economic Advantage and Disadvantage (IRSAD). The ISRAD is divided into deciles and applied to the suburbs by postcode. An example of ISRAD, numbered in the first or second decile indicating low SES, is a family with an income of less than $20,799. At the highest end of the ISRAD, and being assigned either a nine or ten, are areas where the inhabitants earn an income of more than $52,000 per year (Pink, 2013).

The SEIFA used during analysis of the DOHWA data (Joyce & Hutchinson, 2012), were determined from the 2006 Australian Census data whilst Phase 2 of this research used the SEIFA data from the 2011 Australian Census (Australian Bureau of Statistics, 2013c). Both the DOHWA and Phase 2 data were divided into quintiles and quintile one indicated 20% of the areas which have the highest disadvantage score. For further analysis in Phase 2 SEIFA was divided into terciles as documented in the relevant table note.

The BMI of pregnant women was measured during Phase 2 of the research and calculated as weight prior to becoming pregnant divided by height squared. The BMI was categorised into three groups, ranging from normal weight range (18.6 – 24.9), overweight (25 – 29.9) and obese (30 or higher) (Centres for Disease Control and Prevention, 2014) and the median and IQR was calculated.

Closed-ended survey items that measured confidence and belief used the Likert-type scale. The Likert scale is the most frequently used scale in psychology and education for rating beliefs, opinions and attitudes which cannot be measured precisely. The five options were chosen to provide good discriminatory ability. The results were tabulated as ordinal data (Pallant, 2005). The positive answers were at the high end of the scale (Portney & Watkins, 2009). Open responses to items such as "what topics did you search for on the Internet?" from surveys in Phases 1 and 2 were treated as quantitative data and entered into Microsoft Office Excel (2007) as words. The frequency of each response was counted and converted into percentages (Gomm et al., 2000). Cronbach's coefficient alpha was used to establish reliability between variables in Phase 2 of the research (Field, 2013; Portney & Watkins, 2009).

#### 3.93 Qualitative data.

Qualitative data obtained from semi-structured interviews in Phase 2 (Study 2) were analysed using thematic analysis. The analysis is described in Chapter 6 (Section 6.26.2).

# CHAPTER 4

## Phase 1 – An Audit of Antenatal Education Facilitated by Physiotherapists in Western Australian Public Hospitals

### 4.10 Introduction

This chapter reports on the delivery of ANE by PT in WA in 2012.[1] Antenatal education is a method to inform prospective parents about pregnancy (Banta, 2003; Di Mario, Basevi, Gori, & et al., 2005) and caring for newborn babies (Sutherland, Yelland, & Brown, 2012; Svensson et al., 2009). The principles of health promotion can be used with ANE to potentially influence parenting knowledge and maternal self-efficacy (Nutbeam, 2000; Svensson et al., 2009). Studies demonstrate that ANE classes are taught with a variety of pedagogical strategies used in adult education, such as, ice breakers, problem solving, discussion and practical activities during the class (Gagnon & Sandall, 2007; Knowles, 1970). These teaching strategies may promote involvement and participation of prospective parents and increase learning (Nutbeam, 2000; Svensson et al., 2009; Tighe, 2010).

A recent review synthesised the evidence pertaining to physiotherapy-related topics commonly taught at ANE and during the perinatal period (Hay-Smith, 2013). This review concluded that there is strong evidence that PFME are effective for treating and preventing UI. There is also limited evidence that progressive muscle relaxation and breathing may provide benefits during labour and delivery whilst an individual exercise programme may reduce back and pelvic pain (Hay-Smith, 2013).

The prevalence of UI during pregnancy or after birth is between six and 67% (Morkved, 2007). The International Continence Society, NICE guidelines and other researchers recommend that PFME be taught in the ante and postnatal periods and state that PFME are the first-line conservative management for UI in this situation (Abrams et al., 2009; Boyle et al., 2012; Hay-Smith et al., 2009; Ismail, 2009; Morkved, 2007; National Collaborating Centre for Women's and Children's Health [UK], 2006). Another recommendation is that PT who deliver information on continence receive appropriate education and training (Newman et al., 2010).

[1] Chapter 4 is adapted from a published article by the author (Wilson et al., 2014).

## 4.20 Aims

The aims of the study were to identify the:

- Scope of ANE classes in WA;
- Approximate number of pregnant women participating;
- Post-graduate qualifications of the PT;
- Time of day of the ANE class;
- Allocation of hours to ANE services;
- Education strategies used to enhance the learning for class participants;
- Topics facilitated by PT;
- Specific information that is provided to women about PFM and PFME

at ANE facilitated by PT employed in hospitals funded by DOHWA.

## 4.30 Methods

Physiotherapists who facilitated ANE and were employed by the DOHWA at all maternity hospitals were invited to take part in the study. A survey of PT was used to gather data at 31 sites in the seven rural health regions and two urban health regions managed by DOHWA (Western Australian Regions, 2012). Women who attend ANE in health settings are mainly between 30 and 40 weeks' gestation (Lee & Shorten, 1999).

### *Survey design and data collection.*

The survey questionnaire design was based on important topics about ANE that were found in the literature and in particular regarding PT led ANE (Barton, 2005b; Fordyce, 2005). Three PT who specialised in Continence and Women's Health and conducted ANE classes reviewed and tested an initial draft survey. Two of these PT had completed a Masters degree in Continence and Women's Health. Following feedback some items were modified to clarify meaning and the survey format was streamlined to avoid repetition or ambiguity. After a final review from these three PT the final survey questionnaire consisted of 30 items which included open and closed questions and took approximately 15 minutes to complete.

The survey was emailed using a secure online link to physiotherapy managers who worked at the 31 public hospitals which provided obstetric services in WA. The survey was emailed three times if there was no response. The items measured eight main constructs: the geographical location of ANE, number of attendees, qualifications of the PT, time the ANE classes were held, allocation of hours that the health professional was involved, class content, education strategies used in class and PFM education.

***Statistical analysis.***

The overall approach to the statistical analyses is presented in Chapter 3 (Section 3.91). Data from all survey items were analysed using descriptive statistics. Results were presented using numbers and percentages responding to each item, and a flow chart and tables were used to display results.

## 4.40 Results

Twenty six PT from 31 health sites completed the online survey. These 26 PT responded to all 30 items. Five PT who did not respond to the e-mailed survey or the reminder emails were contacted by telephone and four provided partial responses to the questionnaire, whilst one did not respond.

Physiotherapists were involved in delivering ANE at 25 (83.3%) of the Public Hopsitals throughout WA. A summary of the responses is shown in Figure 4.1. In the rural area, three sites provided ANE facilitated by a private physiotherapist due to the unavailablity of a physiotherapist employed by the DOHWA.

Survey responses indicated that approximately 2,844 women attended ANE classes with physiotherapy input during 2011. Data from the DOHWA indicated that of 13,077 women delivering for the first time, 7,446 delivered in Public Hospitals. Incorporating the data from the DOHWA (Joyce & Hutchinson, 2012) and data from this audit, the calculations shown in Figure 4.1, {subtraction of women who are Aboriginal and Torres Strait Islanders (ATSI)} (Reibel & Walker, 2010) provides an estimation of 2,906 primiparae women who did not attend ANE in WA in 2012. The 2,906 non-attenders at ANE does not account for the women who are from culturally and linguistically diverse communities. The culturally and linguistically diverse data were not available from the DOHWA and it became too difficult to do an accurate calculation to estimate how many women may not attend ANE due to speaking

LOTE (Joyce & Hutchinson, 2012). Therefore it is estimated that fewer than 50% of these women attended ANE.

The results of Phase 1 of this research revealed that the Mid-West region, Albany Regional Hospital, Bunbury Regional Hospital, Swan Kalamunda Health Service and Rockingham Health Service were areas where ANE facilitated by a PT was currently unavailable or difficult to access.

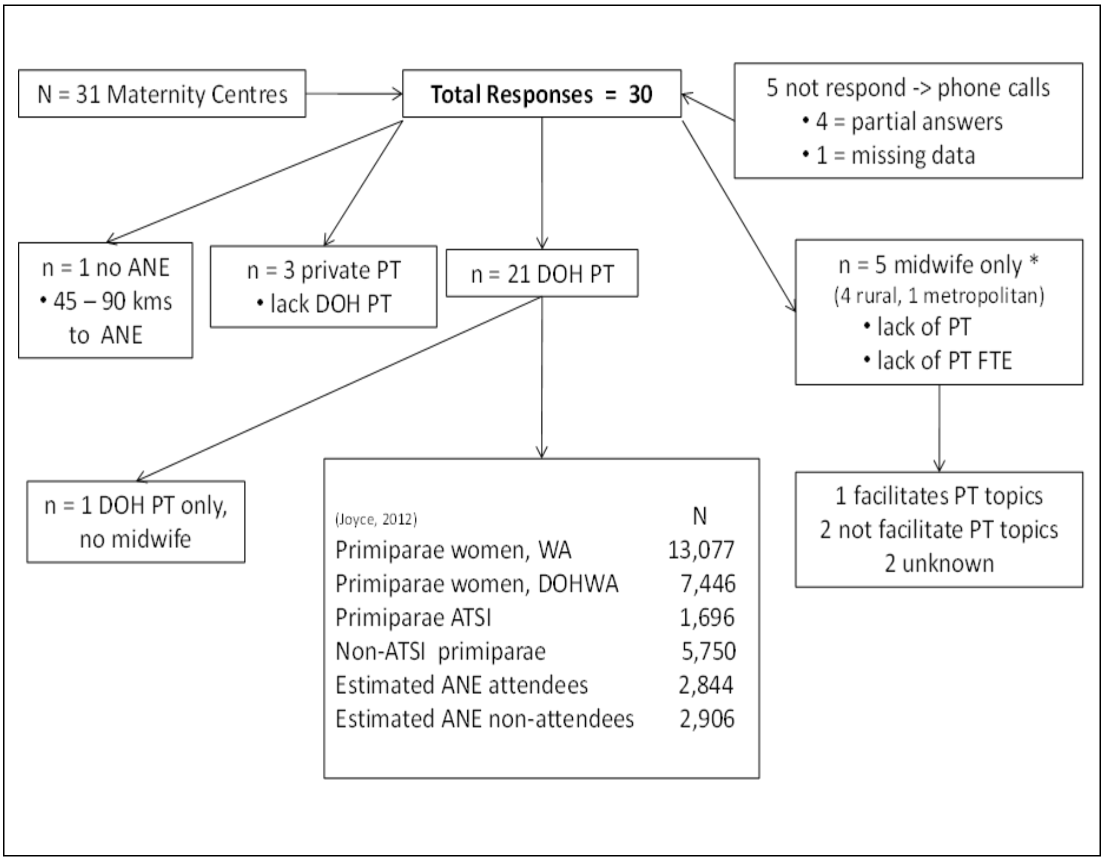



*Figure 4.1.* A summary of antenatal education facilitated by physiotherapists and participants attending antenatal education classes. *One health site in the metropolitan area had PT involvement at ANE only 50% of the time.

Of the PT who facilitated ANE and responded to the survey 13 (61.9%) reported that they had been practicing as PT for more than nine years. Four (19%) PT reported that they had completed a short course in physiotherapy specialising in Continence and Women's Health or were completing a post-graduate qualification in Continence and Women's Health.

Physiotherapists (n = 21 responses) reported that 18 (85.7%) held classes during weekday evenings, 6 (30%) held classes at weekends, and 5 (23.8%) held classes during the weekday working hours. The number of classes conducted per course was between two and six sessions.

The total number of participant contact hours with health practitioners delivering the ANE is shown in Table 4.1. At one site the ANE, a total of eight hours, was delivered solely by a PT with no involvement from a midwife.

Table 4.1.

*Physiotherapy and Midwife Contact Hours During Antenatal Education (n = 21 responses)*

| | Median (range) | Mean |
|---|---|---|
| Contact type | | |
| Physiotherapy | 2 (0.5 – 8) | 2.43 |
| Midwife | 6.5 (0 – 12) | 6.78 |
| Combined physiotherapy and midwife | 8 (6 – 15) | 9.18 |

*Note.* n = 31 health sites with maternity services; no PT involvement at ANE = 6; partial responses = 3; and missing = 1.

Physiotherapy-related topics taught at ANE are shown in Table 4.2. At three ANE classes, which were solely provided by a midwife, the respondents to the survey were unable to identify whether the midwife provided PFM information or other physiotherapy-related topics.

Table 4.2.

*Content of Antenatal Education Facilitated by Physiotherapists*

| Physiotherapy-related topic | Responses (n = 22) |
|---|---|
| Antenatal topic n(%) | |
| Pelvic floor muscle function | 22 (100.0) |
| Pelvic floor muscle exercises | 22 (100.0) |
| Functional pelvic floor exercises | 21 (95.5) |
| Back care | 21 (95.5) |
| Posture | 21 (95.5) |
| Back pain | 21 (95.5) |
| Use of TENS for pain relief in labour | 20 (90.9) |
| Exercise during pregnancy | 19 (86.4) |
| Pelvic girdle pain | 18 (81.8) |
| Relaxation | 18 (81.8) |
| Pelvic floor muscle dysfunction | 18 (81.8) |
| Labour - Positions | 16 (72.7) |
| Perineal massage | 15 (68.2) |
| Urinary incontinence | 15 (68.2) |
| Good bladder habits | 14 (63.6) |
| Constipation | 14 (63.6) |
| Co-contraction - transversus abdominis / pelvic floor | 13 (59.1) |
| Labour – Stages | 13 (59.1) |
| Good bowel habits | 12 (54.5) |

Table 4.2. (continued)

*Content of Antenatal Education Facilitated by Physiotherapists*

| Physiotherapy-related topic | Responses (n = 22) |
|---|---|
| Postnatal Topic n(%) | |
| Exercise | 18 (81.8) |
| Urinary incontinence | 17 (77.3) |
| Breast problems | 15 (68.2) |
| Haemorrhoids | 11 (50.0) |
| Prolapse | 10 (45.5) |
| Faecal incontinence | 8 (36.4) |
| Perineal pain | 8 (36.4) |
| Perinatal resources recommended by PT at ANE n(%) | |
| Websites | 11 (50.0) |
| Books | 2 (9.1) |

*Note.* n = 31 health sites with maternity services; no PT involvement at ANE = 6; partial responses = 2; and missing = 1. TENS = Transcutaneous electrical nerve stimulation.

The strategies used by PT to facilitate learning, during ANE, are summarised in Table 4.4. Practise of PFME was undertaken at 19 (90.5%) of classes. No classses conducted a formal evaluation of the knowledge gained by the participants.

Table 4.3.

*Education Strategies Used During Antenatal Education by Physiotherapists*

| Education Strategy n(%) | Responses (n = 21) |
|---|---|
| Discussion | 20 (95.2) |
| Practise pelvic floor exercises | 19 (90.5) |
| Practise positions for labour | 14 (66.7) |
| Practise back exercises | 14 (66.7) |
| Evaluation form | 14 (66.7) |
| Ice breaker | 13 (61.9) |
| Group activities | 13 (61.9) |
| Teaching aids – such as posters | 13 (61.9) |
| PowerPoint | 11 (52.4) |
| Brainstorming | 11 (52.4) |
| Other practical activities | 10 (47.6) |
| Digital versatile disc / Video | 8 (38.1) |
| Music | 3 (14.3) |
| Quiz | 1 (4.8) |
| Use of overhead projector | 1 (4.8) |
| Evaluate knowledge/strategies gained by participants | 0 (0.0) |

*Note.* n = 31 health sites with maternity services; no PT involvement at ANE = 6; partial responses = 3; and missing = 1.

Education on PFM function and exercises were included in every class taught by a PT. Of the 21 PT who responded to this item, 12 (57.1%) PT recommended a 10 second hold when contracting PFM. Two (9.5%) PT recommended the women base the time the contraction is held on their ability to hold and then build up to a 10 second hold. The number of recommended PFM repetitions ranged from 30 contractions per day by 10 (47.6%) PT to 100 contractions per day by two (9.5%) PT including one (4.8%) recommendation that PFM contractions be repeated as often a possible throughout the day. The four PT with qualifications in Women's Health who all recommended 30 PFM contractions per day with a five to 10 seconds hold and one PT recommended practising the PFME in different positions.

### 4.50 Discussion

Physiotherapists facilitated ANE at 25 of the 30 health sites in WA. Previous research demonstrates that almost all of the women who attend ANE are going to become mothers for the first time (Lee & Shorten, 1999). Survey results demonstrated that less than half of the primiparae women who deliver at a DOHWA health site are likely to receive PFM education from a PT although it is considered important for women from 20 weeks' gestation to practise PFME (Morkved, 2007). There was also variation in the number of hours offered and some PT only provide 30 minutes of education which may not be sufficient time to encompass many physiotherapy- related topics.

The time of day that the ANE classes were conducted was included in the audit as participants who attended ANE, at the work place of the researcher, had requested ANE classes be held on Saturdays instead of during the week. Participants reported that Saturday was preferable as they were too tired to attend ANE after work during the week. Due to budget constraints and health professionals not wishing to work on a Saturday the classes were not rescheduled from week days to the weekends.

All the respondents reported teaching PFM function and facilitation which is in accordance with guidelines (National Collaborating Centre for Women's and Children's Health (UK) 2006, Morkved 2007, Abrams, Andersson et al. 2009, Hay-Smith, Berghmans et al. 2009, Ismail 2009, Boyle, Hay-Smith et al. 2012) to reduce or prevent UI during or following pregnancy. Functional PFME which are also recommended for inclusion in education (Bo, 2007b) were taught by all but one respondent.

There was a large range of reported recommendations for PFME prescription which varied across health settings and five (23.8%) PT (three of whom had qualifications in Women's Health) were following recommended guidelines, namely eight to 12 near maximal contractions, three times per day holding each contraction for three to 10 seconds (Bo, 2007b; Bo & Aschehoug, 2007; Ismail, 2009; National

Collaborating Centre for Women's and Children's Health [UK], 2006). It should be noted that, the responses from the PT did not include information on the strength of hold of the PFM contraction, ie near maximal contraction.

Four responding PT had formal post-graduate qualifications in Continence and Women's Health. In retrospect, a limitation of the study was not to ask about informal education, such as for example; online reading, mentoring, or attendance at a one-off course. Therefore, some of the PT surveyed may have been unaware that it is important to increase the repetitions and length of hold according to the woman's ability (Bo & Aschehoug, 2007). The wide variation in the recommendations for PFME may be related to the training which the PT received.

Respondents reported that recommended adult education strategies (Gagnon & Sandall, 2007; Svensson et al., 2009; Tighe, 2010) were used during ANE. However none of the PT respondents conducted an evaluation which could identify whether the pregnant women reported that they gained knowledge or learnt strategies during ANE. This lack of evaluation may limit the ability of the physiotherapist to evaluate the ANE class to encompass various learning styles (Mainemelis et al., 2002).

Fewer than 50% of pregnant women delivering for the first time in the public sector attended physiotherapy facilitated ANE in WA. There are extraordinary distances and travel times in the rural areas of WA so limited access to a class may be a reason why people do not attend (Western Australian Regions, 2012). Consequently, research investigating new methods of delivering PFME through ANE may be required in WA. E-health platforms are being developed and encouraged, by the Australian Health Informatics Council, with the aim of providing web-based information to improve the effectiveness and efficiency of the healthcare system and improve health outcomes (The Australian Health Informatics Education Council, 2011). Web-based education has been shown to be effective in other areas of health (Beranova & Sykes, 2007; Murray et al., 2009) . Delivery of web-based PFM and other physiotherapy-related education topics programmes may be an alternative method of reaching pregnant women (Murray et al., 2009) who are unable to attend ANE or when ANE by a physiotherapist is unavailable. There would be scope for the web-based PFM programme to have subtitles in LOTE to cater for women from culturally and linguistically diverse and ATSI communities. Alternatively, it may be feasible for PT to liaise with midwives and provide education during routine antenatal clinic visits.

A limitation of the survey was that private PT who facilitate classes were not included in the review and there are at least two large private hospitals that provide ANE in WA. Future research should aim to expand this survey to include collecting data from PT who provide ANE in private settings and to study the provision of ANE through culturally specific services.

The question remains, can PFME be delivered to pregnant women in antenatal classes, or another method of verbal delivery (web-based) with fidelity to the research? If not, the effectiveness of these methods needs to be argued. The investigation would require a measure of the clinical effectiveness of these methods, i.e. a measure of UI, compared to the 'gold standard' method, of individualised, physiotherapy-supervised PFMT.

### 4.60 Conclusions

Physiotherapists are involved in many of the ANE classes funded by the DOHWA, however a small number have post-graduate Women's Health qualifications. The hours of ANE, provided by PT in WA, are variable. While the provision of ANE by a private PT when a DOHWA staff member is unavailable, particularly in rural areas, may allow the continuation of education to pregnant women by PT. All PT who conduct ANE classes teach PFM function and facilitation but there is limited adherence by PT to guideline recommendations for PFME. Further research that investigates the access, interest and barriers for training of PT in the area of Continence and Women's Health is also recommended. Web-based education either in the antenatal clinic waiting room or in the home may be a viable alternative to attendance at ANE classes. This education can also be implemented to help educate and update PT on the recommendations for PFME programmes and how best to implement the education into ANE classes.

# CHAPTER 5

## Phase 2: Study 1 - Survey of Pregnant Women in Western Australia to Evaluate their Knowledge, Beliefs About and Engagement in Pelvic Floor Muscle Exercises

### 5.10 Introduction

There are limited published data describing Australian pregnant women's awareness, knowledge and beliefs about physiotherapy-related topics during the antenatal period. Guidelines recommend that pregnant women attend antenatal education to gain knowledge of the function of PFM and education about how to undertake a PFME programme with the aim of maintaining optimal PFM function.

#### 5.11 Aims.

The aims of Study 1, which was conducted as part of Phase 2 of the research, were to evaluate:

- Pregnant women's awareness and knowledge of PFM and PFME;
- Pregnant women's self-reported engagement in PFME;
- Pregnant women's attendance at ANE;
- The frequency of self-reported UI in pregnant women in WA;
- Pregnant women's usage of the Internet regarding pregnancy-related topics.

#### 5.12 Data collection instruments and procedure.

Data were collected using the Pre-Intervention Questionnaire (Appendix C), which consisted of 52 items and included open and closed questions. The questionnaire was designed to identify the participants' demographic characteristics and to measure awareness, knowledge and behaviour that pertained to PFM, PFME and ANE, the frequency of self-reported UI, usage of the Internet regarding pregnancy-related topics of pregnant women in WA.

The outcomes that were measured with each item in the Pre-Intervention Questionnaire (Appendix C) are documented in Chapter 3 (Table 3.3). These are also summarised below. Procedure for recruitment of pregnant women is described in detail in Chapter 3 (Sections 3.52 and 3.90).

The outcomes measured were respondents':

- Awareness of PFM (items 5 and 6);
- Knowledge of PFM and PFME (items 8 to 12);
- Confidence in and belief about engaging in PFME (items 7 and 18 to 26);
- Attendance and planned attendance at ANE (items 2 to 4);
- Frequency of self-reported UI (item 13);
- Usage of the Internet regarding pregnancy-related topics (items 28 and 29);
- Health seeking behaviour for self-reported UI (items 14 to 17);
- Frequency of self-reported general exercise (item 27);
- Usage of physiotherapy services during pregnancy (items 30 and 31);
- Medical conditions and their effect on PFM dysfunction (item 51).

### 5.13 Statistical analysis.

The overall approach to statistical analyses is described in Chapter 3 (Section 3.91). Data were summarised using descriptive statistics [frequency and means (SD) or medians (IQR)]. Results were presented as numbers and percentages and demographic results were compared to the DOHWA data (Joyce & Hutchinson, 2012). The differences between the respondents who spoke LOTE and English speakers; and primiparae and multiparae women in respondents' levels of practise of PFME; attendance at ANE; usage of the Internet; and pregnancy-related topics sought were compared using the Cross–tabulations of Chi-square, Fisher's Exact Test (Portney & Watkins, 2009). Graphs were generated using Microsoft Office Excel 2007 to show correlations between variables.

### 5.14 Sample size.

The final sample size was reflective of the conservative recruitment for the pilot RCT, but was also chosen to allow confidence that responses obtained would reflect the knowledge and beliefs of the target population of pregnant women in WA. The DOHWA data demonstrated that there were 30,843 babies delivered in 2010 (Joyce & Hutchinson, 2012). Using a 95% confidence interval with a level of significance of $p < .05$ a minimum random sample of 380 was required (Fluidsurveys, 2013).

## 5.20 Results

The participants were from WA so the results were compared with DOHWA data for 2010 (Joyce & Hutchinson, 2012) unless stipulated otherwise, as the data for 2011 were unavailable (Hutchinson & Joyce, 2014). There were 633 pregnant women who responded to the survey. The response rate for each recruitment setting is shown in Figure 5.1. The response rate was highest where the researcher attended the antenatal and ultrasound clinics to recruit the participants in a face-to-face setting.

In the Pre-Intervention Questionnaire (Appendix C) Cronbach's coefficient alpha was run on nine items numbered 15 and 19 to 26 to measure internal reliability of the questionnaire items. Items 14 and 18 were negatively coded so were excluded from analysis. Effect sizes of greater than .8 are considered large on the basis of established psychometric norms. Cronbach's coefficient alpha was .781 which displays a strong correlation between the variables (Field, 2013; Portney & Watkins, 2009).

There were 850 surveys circulated of which 633 (74.5%) were completed and returned. There were 444 (60%) respondents who were recruited from one site (Swan District Hospital in the NMHS area) with face-to-face contact. Swan District Hospital is 23 kilometres from the centre of Perth. The remaining respondents, collected by face-to-face contact and snowballing, were from 25 health sites in WA (including private clinics). The setting has been described in detail in Chapter 3 (Section 3.30).

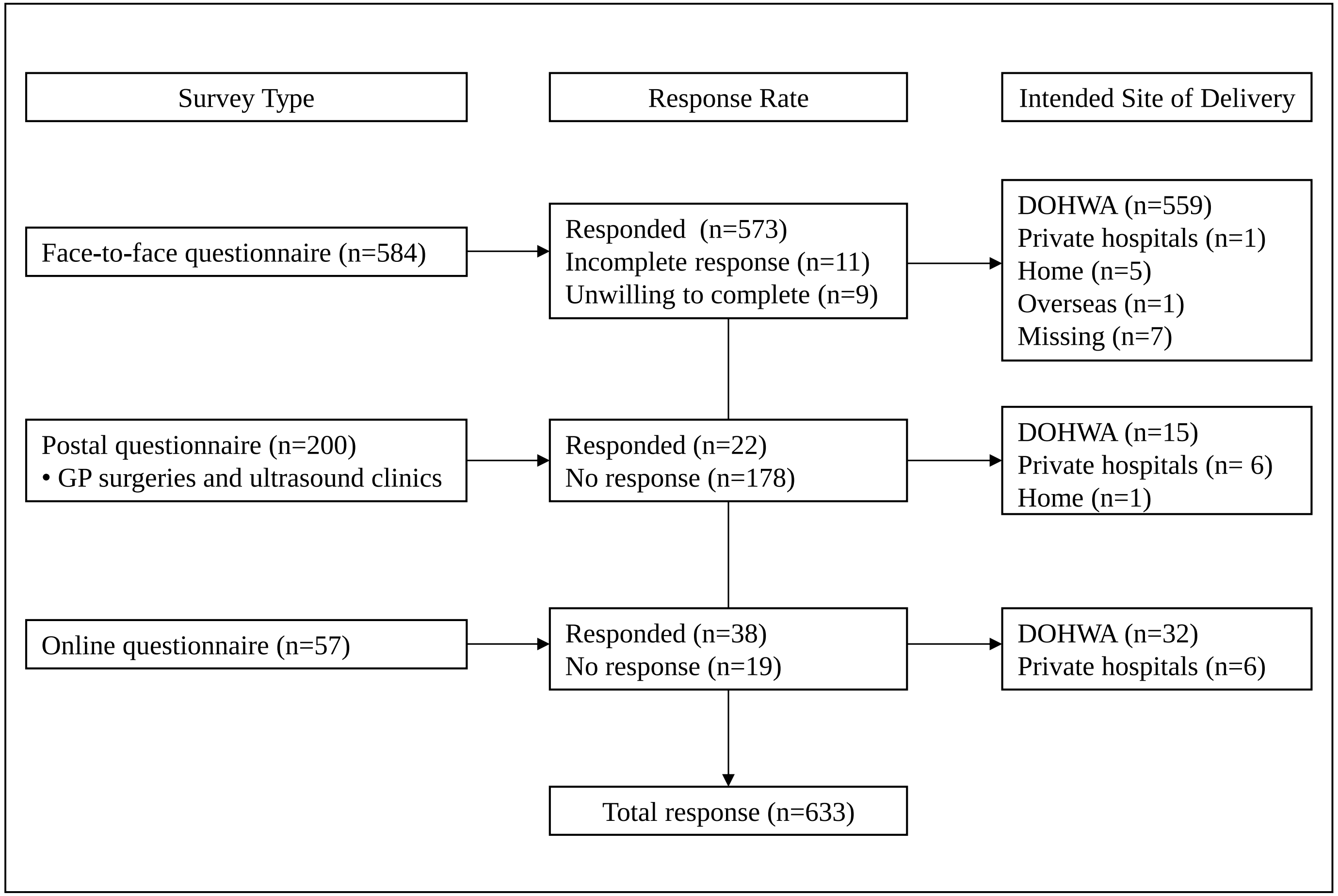



*Figure 5.1.* Survey type, response rate and intended site of delivery.

### 5.21 Demographic characteristics of respondents.

The respondents' demographic characteristics are presented in Table 5.1. The age of the respondents ranged from 18 to 46 years whilst the DOHWA data included women aged from 13 to 53 years. The number of respondents who were single 36 (5.7%) was less than half the percentage of single women for DOHWA of 3,848 (12.5%). The percentage of respondents born in Asia was 124 (19.6%) almost double the proportion of women with an Asian country of birth reported by DOHWA of 3,250 (10.8%).

The survey responses also indicated that women from the NMHS were proportionally more represented in the sample compared to the DOHWA data. Responses were received from 439 (69.4%) of respondents who intended to deliver in the NMHS compared to 12,220 (39.6%) for DOHWA.

Appendix N (Table 1) presents responses for the item that surveyed the self-reported smoking habits of respondents during pregnancy. Comparison of the smoking and non-smoking rates for Phase 2 and DOHWA showed that the rates were consistent for both groups. When the respondents became pregnant there were 115 (18.2%) self-reported smokers of whom 52 (45.2%) reported having stopped smoking during pregnancy.

Table 5.1.

*Demographic Characteristics of Respondents*

| Characteristic | Respondents (n = 633) | DOHWA (n = 30,843) |
|---|---|---|
| Age | | |
| Age (years), mean $\pm$SD | 29.2 $\pm$5.3 | 29.6 $\pm$[a] |
| Missing n(%) | 37 (5.8) | |
| Marital status n(%) | | |
| Married/de facto | 581 (91.8) | 26,352 (85.4) |
| Single | 36 (5.7) | 3,848 (12.5) |
| Other | 3 (0.5) | 643 (2.1) |
| Missing | 13 (2.0) | |
| SEIFA quintiles n(%) | | |
| 1 (low SES) | 19 (3.0) | 2,748 (9.0) |
| 11 | 48 (7.6) | 4,604 (15.1) |
| 111 | 218 (34.4) | 7,578 (24.8) |
| 1V | 125 (19.7) | 6,842 (22.4) |
| V (high SES) | 156 (24.7) | 8,796 (28.8) |
| Missing | 67 (10.6) | 275 (not included)[a] |
| Education level completed n(%) | | |
| University[b] | 186 (29.3) | |
| Technical and Further Education | 123 (19.4) | |
| Year 12 | 155 (24.5) | |
| Year 10 | 127 (20.1) | |
| Other[c] | 13 (2.1) | |
| Missing | 29 (4.6) | |
| Receipt of government assistance[d] n(%) | | |
| No | 520 (82.2) | |
| Yes | 75 (11.8) | |
| Don't know | 3 (0.5) | |
| Missing | 35 (5.5) | |

Table 5.1. (continued)

*Demographic Characteristics of Respondents*

| Characteristic | Respondents (n = 633) | DOHWA (n = 30,120)[e] |
|---|---|---|
| Country of birth n(%) | | |
| Australia & New Zealand | 388 (61.3) | 21,717 (72.0) |
| United Kingdom & Ireland | 38 (6.0) | 2,173 (7.2) |
| Asia | 124 (19.6) | 3,250 (10.8) |
| Other Europe, South & Central America & Pacific (inhabitants speak LOTE) | 41 (6.5) | 2,116 (7.1) |
| South Africa, Zimbabwe, North America (inhabitants speak English) | 34 (5.4) | 864 (2.9) |
| Missing | 8 (1.2) | |
| Language spoken at home | | |
| Languages other than English | 114 (18.0) | |
| Missing | 8 (1.3) | |
| Identifies as ATSI[f] n(%) | | (n = 30,843) |
| Yes | 25 (3.9) | 1,683 (5.5) |
| Missing | 14 (2.2) | |

[a]DOHWA did not report SD with age; nor stipulate why 275 women were not included.

[b]Included three (0.5%) women who were either a midwife or a physiotherapist.

[c]Did not attend school, finish primary school or complete year 10.

[d]Payments due to ill health, low income or unemployment.

[e]748 women unable to ascertain country of birth.

[f]Aboriginal and Torres Strait Islander women.

Table 5.2 reports the respondents' gestation, parity, medical conditions, BMI, and frequency of self-reported general exercise. Almost one third of the respondents [n = 200 (31.6%)] were overweight or obese prior to becoming pregnant.

Table 5.2.

*Gestation, Parity, Medical Conditions, Body Mass Index and Self-Reported General Exercise of Respondents*

| Characteristic | Respondents (n = 633) | DOHWA (n = 30,843) |
|---|---|---|
| Gestation | | |
| Gestation (weeks), mean ±SD | 28.7 ±7.8 | |
| Gestation (weeks), median (IQR) | 30 (12) | |
| Missing n(%) | 13 (2.1) | |
| Parity | | |
| Parity, median (IQR) | 0 (1) | |
| 0 n(%) | 317 (50.1) | 13,065 (42.4) |
| 1 or more | 305 (48.2) | 15,778 (57.7) |
| Missing | 11 (1.7) | |
| Medical conditions n(%)[a] | | |
| No medical condition | 390 (61.6) | 20,909 (67.8) |
| Asthma/cough | 62 (9.8) | 3,377 (10.9) |
| Neurological | 2 (0.4) | * |
| Irritable bowel syndrome | 12 (1.9) | * |
| Constipation | 21 (3.3) | * |
| Other[b] | 42 (5.8) | * |
| Missing[c] | 116 (18.3) | |

Table 5.2. (continued)

*Gestation, Parity, Medical Conditions and Body Mass Index and Self-Reported General Exercise of Respondents*

| Characteristic | Respondents (n = 633) | DOHWA (n = 30,843) |
|---|---|---|
| BMI[c] | | * |
| BMI, median (IQR) | 23.6 (6.6) | |
| Normal (< 25.0) n(%) | 330 (52.1) | |
| Overweight (25.0 to 29.9) n(%) | 107 (16.9) | |
| Obese (> 29.9) n(%) | 93 (14.7) | |
| Missing[d] n(%) | 103 (16.3) | |
| Frequency of self-reported general exercise n(%) | | * |
| 30 minutes x 5/week | 126 (19.9) | |
| 30 minutes x 1 – 4/week | 179 (28.3) | |
| 10 – 20 minutes x 5/week | 98 (15.5) | |
| 10 minutes x 1- 4/week | 106 (16.7) | |
| Never | 79 (12.5) | |
| Other[e] | 20 (3.2) | |
| Missing | 25 (3.9) | |

*Note.* *No data available.

[a]More than one answer was accepted.

[b]Included mental health issues, complications of pregnancy, arthritis, back surgery, allergies.

[c]BMI was calculated as weight prior to becoming pregnant divided by height squared; height and weight were measured at antenatal clinics.

[d]Data are missing because respondents were unable to remember their height.

[e]Included movement at work, bed rest due to complications of pregnancy and lack of time.

### 5.22 Respondents' awareness, sources of information and knowledge of function and anatomy of pelvic floor muscles.

Table 5.3 presents survey responses that measured the respondents' awareness of PFM and PFME and how respondents' obtained information on PFM. The English speaking respondents had a significantly greater awareness of PFM; and were also significantly more likely to have previously exercised their PFME; compared to respondents who spoke LOTE. These findings were present in both primiparae and multiparae groups of respondents.

There were 523 (82.6%) respondents who had heard of PFM and of these respondents 316 (60.4%) received the information from midwives. There were 179 (34.2%) respondents who reported that they received PFM information from "other sources." Of these 94 (52.5%) of respondents reported that they had received information from family or friends; 40 (22.4%) from previous education; 31 (17.3%) at the gym, yoga or pilates classes; 13 (7.3%) from the television; and 12 (6.7%) from a GP.

Table 5.4 presents survey responses that measured the respondents' knowledge of the function and anatomy of the PFM. Respondents who had attended ANE had a significantly greater knowledge of the function and anatomy of PFM and a significantly greater knowledge that PFM dysfunction causes UI during pregnancy compared to respondents who had not attended ANE.

Respondents who attended ANE had a significantly greater knowledge that PFM can be trained indirectly by the co-contraction of transversus abdominis (should work together) compared to respondents who had not attended ANE. Respondents who attended ANE had a significantly greater knowledge that PFME should be practised daily compared to respondents who had not attended ANE.

Table 5.3.

*Respondents' Awareness and Sources of Information on Pelvic Floor Muscles*

| | | Parity (0) | | | Parity (> 0) | | |
|---|---|---|---|---|---|---|---|
| | | | | Language spoken at home | | | |
| Awareness item | Respondents (n = 633) | LOTE (n = 60) | English (n = 256) | Fisher's Exact *p*-value | LOTE (n= 53) | English (n = 251) | Fisher's Exact *p*-value |
| Have you heard of your pelvic floor muscles? n(%) | | | | | | | |
| Yes | 523 (82.6) | 26 (43.3) | 220 (86.0) | < .001 | 25 (47.1) | 241 (96.0) | < .001 |
| No | 92 (14.6) | 30 (50.0) | 27 (10.5) | | 26 (49.1) | 7 (2.8) | |
| Don't know | 18 (2.8) | 4 (6.7) | 9 (3.5) | | 2 (3.8) | 3 (1.2) | |

Table 5.3. (continued)

*Respondents' Awareness and Sources of Information on Pelvic Floor Muscles*

| | | Parity (0) | | | Parity (> 0) | | |
|---|---|---|---|---|---|---|---|
| | | Language spoken at home | | | | | |
| Awareness item | Respondents (n = 523) | LOTE (n = 26) | English (n = 220) | Fisher's Exact *p*-value | LOTE (n= 25) | English (n = 241) | Fisher's Exact *p*-value |
| If you have heard of pelvic floor muscles, where did you hear about them? [a] n(%) | | | | * | | | * |
| Midwife | 316 (60.4) | 11 (42.3) | 93 (42.3) | | 14 (56.0) | 188 (78.0) | |
| Book | 141 (27.0) | 8 (30.8) | 65 (29.5) | | 5 (20.0) | 61 (25.3) | |
| Internet | 121 (23.1) | 15 (57.7) | 63 (28.6) | | 6 (24.0) | 37 (15.3) | |
| Physiotherapist | 96 (18.4) | 4 (15.4) | 32 (14.5) | | 3 (12.0) | 55 (22.8) | |
| Other sources | 179 (34.2) | 5 (19.2) | 100 (45.4) | | 5 (20.0) | 65 (27.0) | |

Table 5.3. (continued)

*Respondents' Awareness and Sources of Information on Pelvic Floor Muscles*

| | | Parity (0) | | | Parity (> 0) | | |
|---|---|---|---|---|---|---|---|
| | | Language spoken at home | | | | | |
| Awareness item | Respondents (n = 633) | LOTE (n = 60) | English (n = 256) | Fisher's Exact *p*-value | LOTE (n= 53) | English (n = 251) | Fisher's Exact *p*-value |
| To your knowledge have you ever exercised your PFM? n(%) | | | | | | | |
| Yes | 360 (56.9) | 12 (20.0) | 135 (52.7) | < .001 | 14 (26.4) | 192 (76.5) | < .001 |
| No | 109(17.2) | 24 (40.0) | 45 (17.6) | | 18 (34.0) | 20 (8.0) | |
| Doing PFME | 72 (11.4) | 6 (10.0) | 36 (14.1) | .145 | 1 (1.9) | 27 (10.8) | .060 |
| Don't know | 91 (14.4) | 18 (30.0) | 39 (15.2) | | 20 (37.7) | 12 (4.7) | |
| Missing | 1 (0.1) | | 1 (0.4) | | | | |

*Note*. *Data demonstrates equality of results or statistical analysis is not applicable.

[a]Able to select more than one answer.

Table 5.4.

*Respondents' Knowledge about Function and Anatomy of Pelvic Floor Muscles*

| | | Parity | | Attended ANE | Not attended ANE | Fisher's Exact | Consulted PT (back pain or UI) |
|---|---|---|---|---|---|---|---|
| | Respondents | 0 | > 0 | | | | |
| Knowledge item | (n = 633) | (n = 317) | (n = 305) | (n = 178) | (n = 454) | *p*-value | (n = 57) |
| What do your pelvic floor muscles do?[a] n(%) | | | | | | | |
| Don't know | 131 (20.7) | 80 (25.2) | 47 (15.4) | 12 (6.7) | 119 (26.2) | < .001 | 4 (7.0) |
| A: Prevent UI[b] | 481 (76.0) | 226 (71.2) | 249 (81.7) | 163 (91.5) | 318 (69.9) | < .001 | 52 (91.2) |
| B: Prevent faecal incontinence [b] | 173 (27.30) | 92 (29.0) | 79 (25.9) | 63 (35.4) | 110 (24.2) | .004 | 23 (40.4) |
| C: Support your back[b] | 72 (11.4) | 38 (12.0) | 34 (11.1) | 26 (14.6) | 46 (10.1) | .069 | 9 (15.8) |
| A and B and C[c] | 17 (2.7) | 7 (2.2) | 10 (3.3) | 7 (3.9) | 10 (2.2) | * | 3.0 (5.3) |
| None of the answers is correct | 5 (0.8) | 1 (0.3) | 4 (1.3) | 2 (1.1) | 3 (0.7) | | |
| Missing | 1 (0.2) | | | | 1 (0.2) | | |

Table 5.4. (continued)

*Respondents' Knowledge about Function and Anatomy of Pelvic Floor Muscles*

| | | Parity | | Attended ANE | Not attended ANE | Fisher's Exact | Consulted PT (back pain or UI) |
|---|---|---|---|---|---|---|---|
| Knowledge item | Respondents (n = 633) | 0 (n = 317) | > 0 (n = 305) | (n == 178) | (n = 454) | *p*-value | (n = 57) |
| What do your pelvic floor muscles go around? [a] n(%) | | | | | | | |
| Don't know | 239 (37.8) | 129 (40.7) | 106 (34.8) | 40 (22.5) | 199 (43.7) | < .001 | 16 (28.1) |
| A Bladder exit[b] | 345 (54.5) | 159 (50.2) | 182 (59.7) | 125 (70.2) | 220 (48.3) | < .001 | 34 (59.7) |
| B Vagina[b] | 315 (49.7) | 152 (48.0) | 159 (52.1) | 105 (59.0) | 210 (46.1) | .004 | 33 (57.9) |
| C Bowel[b] | 45 (7.1) | 27 (8.5) | 18 (5.9) | 18(10.1) | 27 (5.9) | .090 | 4 (7.0) |
| A and B and C[c] | 34 (5.4) | 20 (6.3) | 14 (4.6) | 14 (7.9) | 20 (4.4) | * | 4 (7.0) |
| None of the answers is correct | 4 (0.6) | 3 (0.9) | 1 (0.3) | 1 (0.6) | 4 (0.9) | | |
| Missing | 2 (0.3) | | | 1 (0.6) | 1 (0.2) | | |

Table 5.4. (continued)

*Respondents' Knowledge about Function and Anatomy of Pelvic Floor Muscles*

| | | Parity | | Attended ANE | Not attended ANE | Fisher's Exact | Consulted PT (back pain or UI) |
|---|---|---|---|---|---|---|---|
| Knowledge item | Respondents (n = 633) | 0 (n = 317) | > 0 (n = 305) | (n == 178) | (n = 454) | *p*-value | (n = 57) |
| Why might women leak urine when they are pregnant? [a] n(%) | | | | | | | |
| Don't know | 169 (26.7) | 88 (27.8) | 77 (25.2) | 24 (13.5) | 145 (31.9) | < .001 | 11 (19.3) |
| A: They are pregnant | 238 (37.6) | 116 (36.6) | 118 (38.7) | 69 (38.8) | 169 (37.2) | * | 24 (42.2) |
| B: Their bladder is too small | 149 (23.6) | 75 (23.7) | 71 (23.3) | 39 (21.9) | 110 (24.2) | * | 17 (29.9) |
| C: Their pelvic floor muscles do not work properly[c] | 384 (60.7) | 180 (56.8) | 199 (65.2) | 137 (77.0) | 247 (54.3) | < .001 | 38 (66.7) |
| C only[c] | 198 (31.3) | 96 (30.3) | 102 (33.4) | 81 (45.5) | 117 (25.8) | < .001 | 24 (42.4) |
| None of the answers is correct | 11 (1.7) | 8 (2.5) | 1 (0.3) | 1 (0.6) | 10 (2.2) | * | 1 (1.8) |
| Missing | 2 (0.3) | | | 1 (0.6) | 1 (0.2) | | |

Table 5.4. (continued)

*Respondents' Knowledge about Function and Anatomy of Pelvic Floor Muscles*

| | | Parity | | Attended ANE | Not attended ANE | Fisher's Exact | Consulted PT (back pain or UI) |
|---|---|---|---|---|---|---|---|
| | Respondents | 0 | > 0 | | | | |
| Knowledge item | (n = 633) | (n = 317) | (n = 305) | (n == 178) | (n = 454) | *p*-value | (n = 57) |
| Your pelvic floor muscles and lower tummy muscle should work together? n(%) | | | | | | | |
| True (includes sometimes)[c] | 301 (47.5) | 138 (43.5) | 159 (52.1) | 96 (54.0) | 205 (45.1) | .042 | 28 (49.3) |
| False | 41 (6.5) | 25 (7.9) | 16 (5.3) | 11 (6.2) | 30 (6.6) | | 6 (10.6) |
| Don't know | 289 (45.7) | 154 (48.6) | 130 (42.6) | 70 (39.3) | 219 (48.1) | | 23 (40.1) |
| Missing | 2 (0.3) | | | 1 (0.5) | 1 (0.2) | | |

Table 5.4. (continued)

*Respondents' Knowledge about Function and Anatomy of Pelvic Floor Muscles*

| | | Parity | | Attended ANE | Not attended ANE | Fisher's Exact | Consulted PT (back pain or UI) |
|---|---|---|---|---|---|---|---|
| Knowledge item | Respondents (n = 633) | 0 (n = 317) | > 0 (n = 305) | (n == 178) | (n = 454) | *p*-value | (n = 57) |
| How often should you exercise your pelvic floor muscles? n(%) | | | | | | | |
| Daily (includes 2+/wk )[c] | 432 (68.3) | 208 (65.6) | 218 (71.5) | 150 (84.3) | 282 (62.0) | < .001 | 39 (68.4) |
| 1/wk | 26 (4.1) | 9 (2.8) | 17 (5.6) | 8 (4.5) | 18 (4.0) | * | 6 (10.5) |
| Never | 26 (4.1) | 17 (5.4) | 9 (3.0) | 4 (2.2) | 22 (4.8) | * | 1 (1.8) |
| Don't know | 146 (23.1) | 83 (26.2) | 60 (19.7) | 14 (7.9) | 132 (29.0) | * | 11 (19.3) |
| Missing | 3 (0.4) | | 1 (0.2) | 2(1.1) | 1 (0.2) | | |

Table 5.4. (continued)

*Respondents' Knowledge about Function and Anatomy of Pelvic Floor Muscles*

| Knowledge item | Respondents (n = 633) | Parity 0 (n = 317) | Parity > 0 (n = 305) | Attended ANE (n == 178) | Not attended ANE (n = 454) | Fisher's Exact *p*-value | Consulted PT (back pain or UI) (n = 57) |
|---|---|---|---|---|---|---|---|
| If I leak urine (wee) when I am pregnant[a] n(%) | | | | | | | |
| I don't know if there is treatment available | 73 (11.5) | 37 (11.7) | 36 (11.8) | 15 (8.4) | 58 (12.7) | * | 5 (8.8) |
| I will ask for help[c] | 364 (57.5) | 191 (60.2) | 170 (55.8) | 106 (59.6) | 258 (56.7) | * | 41 (72.0) |
| I won't think incontinence is a problem | 159 (25.1) | 78 (24.6) | 8 1(26.5) | 44 (24.8) | 115 (25.3) | * | 8 (14.0) |
| I won't ask for help as I will be embarrassed | 24 (3.8) | 9 (2.8) | 15 (5.0) | 7 (3.90) | 17 (3.8) | * | 3 (5.3) |
| I won't ask for help as I have a male doctor | 4 (0.6) | 3 (0.9) | 1 (0.3) | 1 (0.6) | 3 (0.6) | * | |
| Missing data | 32 (5.5) | 13 (4.1) | 11 (3.6) | 7 (3.9) | 25 (5.5) | | 1 (1.8) |

Table 5.4. (continued)

*Respondents' Knowledge about Function and Anatomy of Pelvic Floor Muscles*

| Knowledge item | Respondents (n = 633) | Parity 0 (n = 317) | Parity > 0 (n = 305) | Attended ANE (n == 178) | Not attended ANE (n = 454) | Fisher's Exact *p*-value | Consulted PT (back pain or UI) (n = 57) |
|---|---|---|---|---|---|---|---|
| If I leak urine I will ask the following person(s) for help[a] n(%) | | | | | | | |
| Physiotherapist[c] | 116 (18.3) | 58 (18.3) | 58 (19.0) | 50 (28.1) | 66 (14.5) | * | 19 (33.3) |
| Midwife[c] | 426 (67.3) | 217 (68.5) | 206 (67.5) | 135 (75.8) | 291 (64.0) | * | 40 (70.2) |
| Doctor[c] | 282 (44.5) | 146 (46.1) | 135 (44.3) | 77 (43.3) | 205 (45.1) | * | 23 (40.4) |
| Not look for help | 71 (11.2) | 39 (12.3) | 32 (10.5) | 14 (7.9) | 57 (12.5) | * | 5 (8.8) |
| Other | 25 (3.9) | 17 (5.4) | 8 (2.6) | 4 (2.2) | 21 (4.6) | * | 3 (5.3) |
| Missing | 32 (5.5) | 13 (4.1) | 14 (4.6) | 9 (5.1) | 26 (5.7) | | 2 (3.5) |

*Note.* *Data demonstrates equality of results or statistical analysis is not applicable.

[a]Able to choose more than one answer.

[b]Partially correct answer.

[c]Correct answer.

### 5.23 Respondents' beliefs regarding engagement in pelvic floor muscle exercises.

Table 5.5 presents responses regarding respondents' confidence in and belief about engaging in PFME. There were 262 (41.4%) respondents who believed it was normal to leak urine when they were pregnant.

There were 194 (62.2%) respondents who believed that there was treatment for UI during pregnancy. There were 545 (86.1%) women who answered that they would do PFME if advised and 524 (82.8%) who responded that the PFM would become stronger whilst 473 (74.7%) respondents believed that PFME would prevent or improve leakage of urine.

Respondents who spoke English were significantly more likely to be practicing PFME during their current pregnancy compared to respondents who spoke LOTE, [English, n = 63 (12.3%); LOTE, n = 7 (6.1%); ($p$ = .023)]. Respondents who spoke English were significantly more likely to have previously exercised their PFME compared to respondents who spoke LOTE, [English, n = 327 (64.5%); LOTE, n = 26 (22.4%); ($p$ = .023) (Table not shown)].

Table 5.6 compares respondents who were currently doing PFME with frequency of self-reported general exercise, self-reported UI and attendance at ANE. Respondents who were practicing PFME were significantly more likely to have attended ANE than respondents who were not practicing PFME. Respondents who were practicing PFME were significantly more likely to be doing general exercise than respondents who were not practicing PFME.

Table 5.5.

*Respondents' Beliefs Regarding Pelvic Floor Muscle Exercises*

| | Response n(%) = 633 (100%) | | | | | |
|---|---|---|---|---|---|---|
| Belief statement | SA | A | U | D | SD | Missing |
| I think it is normal for women to leak urine (wee) when pregnant[a] | 23 (3.6) | 239 (37.8) | 178 (28.1) | 141 (22.3) | 24 (3.8) | 28 (4.4) |
| I think there is treatment or help for women who leak urine (wee) when pregnant | 76 (12.0) | 318 (50.2) | 180 (28.4) | 22 (3.5) | 5 (0.8) | 32 (5.1) |
| I believe I will start to leak urine (wee) while pregnant or my leakage will get worse[a] | 21 (3.3) | 144 (22.7) | 226 (35.8) | 170 (26.9) | 23 (3.6) | 49 (7.7) |
| If I receive information on my pelvic floor muscles I intend to follow the advice given | 159 (25.1) | 351 (55.5) | 60 (9.5) | 9 (1.4) | 5 (0.8) | 49 (7.7) |
| If I am advised to do pelvic floor muscle exercises I will try to do them | 201 (31.8) | 344 (54.3) | 30 (4.7) | 8 (1.3) | 1 (0.2) | 49 (7.7) |
| If I follow the advice to do the pelvic floor muscle exercises I will become better at them | 183 (28.9) | 351 (55.5) | 39 (6.2) | 9 (1.4) | 2 (0.3) | 49 (7.7) |
| If I follow the advice to do the pelvic floor muscle exercises I will become stronger | 229 (36.2) | 295 (46.6) | 50 (7.9) | 7 (1.1) | 2 (0.3) | 50 (7.9) |

Table 5.5. (continued)

*Respondents' Beliefs Regarding Pelvic Floor Muscle Exercises*

| | Response n(%) = 633 (100%) | | | | | |
|---|---|---|---|---|---|---|
| Belief statement | SA | A | U | D | SD | Missing |
| My friends have informed me that I should do pelvic floor muscle exercises | 108 (17.1) | 260 (41.1) | 105 (16.5) | 96 (15.2) | 14 (2.2) | 50 (7.9) |
| I will be able to follow the pelvic floor muscle exercise advice when I am busy | 98 (15.5) | 287 (45.3) | 146 (23.1) | 47 (7.4) | 3 (0.5) | 52 (8.2) |
| Reminding myself to do the pelvic floor muscle exercises will be easy | 51 (8.1) | 274 (43.3) | 150 (23.7) | 102 (16.1) | 4 (0.6) | 52 (8.2) |
| I believe that pelvic floor muscle exercises will prevent or improve leakage of urine (wee) | 180 (28.4) | 293 (46.3) | 99 (15.6) | 8 (1.3) | 1 (0.2) | 52 (8.2) |

*Note*. SA = strongly agree; A = agree; U = undecided; D = disagree; SD = strongly disagree.

[a]Strongly disagree and disagree indicate belief in the effect of adhering to a PFME programme or high self-efficacy for adhering to a PFME programme. All other items strongly agree and agree indicate high self-efficacy for adhering to a PFME programme.

Table 5.6.

*Respondents' Engagement in Pelvic Floor Muscle Exercises Compared to their Self-Reported Levels of General Exercise, Self-Reported Urinary Incontinence and Attendance at Antenatal Education*

| Characteristic | Respondents practicing PFME (n = 72) | Respondents not practicing PFME (n = 560) | Fisher's Exact *p*-value |
|---|---|---|---|
| Self-reported urinary incontinence | | | |
| Never | 29 (40.1) | 263 (46.9) | .338 |
| <1/week | 24 (33.1) | 151 (27.0) | * |
| >1/week | 12 (16.8) | 70 (12.5) | * |
| Daily | 4 (5.7) | 49 (8.8) | * |
| Don't know | 1 (1.5) | 12 (2.1) | * |
| Missing | 2 (2.8) | 15 (2.7) | |
| Attendance at ANE n(%) | | | |
| Planning to attend | 29 (40.3) | 199 (35.5) | |
| Not planning to attend | 9 (12.5) | 179 (32.0) | < .001 |
| Attended | 32 (44.5) | 146 (26.0) | .019 |
| Don't know | 1 (1.4) | 30 (5.4) | * |
| ANE unavailable | 1 (1.4) | 6 (1.1) | |
| Frequency of general exercise | | | |
| 30 minutes x 5/week | 16 (22.2) | 109 (19.4) | * |
| 30 minutes x 1 – 4/week | 20 (27.8) | 159 (28.7) | * |
| 10 – 20 minutes x 5/week | 17 (23.6) | 81 (14.4) | * |
| 10 minutes x 1- 4/week | 10 (13.9) | 96 (17.0) | * |
| Never | 3 (4.2) | 76 (13.6) | .006 |
| Other | 3 (4.2) | 17 (3.0) | |
| Missing | 3 (4.1) | 22 (3.9) | |

*Note.* *Data demonstrates equality of results or statistical analysis is not applicable.

### 5.24 Respondents' attendance at antenatal education.

Table 5.7 presents the responses to items that measured respondents' attendance at ANE, while Table 5.8 demonstrates parity, language spoken at home and attendance at ANE. English speaking respondents were significantly more likely to have attended ANE during a previous pregnancy compared to respondents who spoke LOTE. Table 5.9 demonstrates SES, level of education and attendance at ANE. Respondents from a high SES and with tertiary education were significantly more likely to be planning to attend ANE compared to respondents from a middle or lower SES and who did not have a tertiary education. Respondents with tertiary education were significantly more likely to have attended ANE compared to respondents who did not have a tertiary education.

Table 5.7.

*Respondents' Attendance at Antenatal Education*

| | | Parity | |
|---|---|---|---|
| Attendance at ANE n(%) | Respondents (n = 633) | 0 (n =317) | > 0 (n = 305) |
| Planning to attend | 229 (36.2) | 196 (61.8) | 31 (10.2) |
| Not planning to attend | 188 (29.7) | 43 (13.6) | 139 (45.6) |
| Attended this pregnancy | 51 (8.1) | 45 (14.2) | 5 (1.6) |
| Attended previous pregnancy | 127 (20.1) | 3 (0.9) | 122 (40.0) |
| Don't know | 31 (4.8) | 24 (7.6) | 7 (2.3) |
| ANE unavailable | 7 (1.1) | 6 (1.9) | 1 (0.3) |

Table 5.8.

*Respondents' Parity, Language Spoken at Home and Attendance at Antenatal Education*

| | Parity (0) | | Parity (> 0) | | |
|---|---|---|---|---|---|
| | Language spoken at home | | | | |
| Attendance at ANE n(%) | LOTE (n = 60) | English (n = 256) | LOTE (n = 53) | English (n = 251) | Fisher's Exact *p*-value |
| Planning to attend | 33 (55.0) | 162 (63.3) | 10 (18.9) | 21 (8.4) | |
| Not planning to attend | 14 (23.3) | 29 (11.3) | 30 (56.6) | 109 (43.4) | .004 |
| Attended | 7 (11.7) | 41 (16.0) | 9 (17.0) | 117 (46.6) | < .001 |
| Don't know | 3 (5.0) | 21 (8.2) | 3 (5.7) | 4 (1.6) | |
| ANE unavailable | 3 (5.0) | 3 (1.2) | 1 (1.9) | | |

Table 5.9.

*Respondents' SEIFA, Level of Education and Attendance at Antenatal Education*

| | SEIFA[a] | | | | Level of education | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Attendance at ANE n(%) | Low (n = 67) | Middle (n = 269) | High (n = 230) | Fisher's Exact *p*-value | Year 10 (n = 127) | TAFE (n = 123) | Year 12 (n = 155) | Tertiary (n = 183) | Fisher's Exact *p*-value |
| Planning to attend | 18 (26.8) | 91 (33.8) | 96 (41.8) | .015 | 24 (18.8) | 54 (43.9) | 56 (36.1) | 81 (44.3) | .003 |
| Not planning to attend | 30 (44.8) | 87 (32.4) | 55 (23.9) | .002 | 57 (44.9) | 30 (24.4) | 50 (32.4) | 32 (17.5) | < .001 |
| Attended this pregnancy | 6 (9.0) | 21 (7.8) | 18 (7.8) | .301 | 10 (7.9) | 11 (8.9) | 14 (9.0) | 15 (8.2) | .046 |
| Attended previous | 9 (13.4) | 53 (19.7) | 50 (21.7) | .301 | 25 (19.7) | 23 (18.7) | 23 (14.8) | 48 (26.2) | .046 |
| Don't know | 2 (3.0) | 15 (5.6) | 9 (3.9) | | 11 (8.7) | 5 (4.1) | 9 (5.8) | 4 (2.2) | |
| ANE unavailable | 2 (3.0) | 2 (0.7) | 2 (0.9) | | | | 3 (1.9) | 3 (1.6) | |

*Note.* TAFE = Technical and Further Education.

[a]SEIFA was re-coded into terciles.

### 5.25 Respondents' self-reported urinary incontinence.

Respondents' levels of self-reported UI are presented in Table 5.10. There were 310 (49.0%) respondents who reported that they experienced UI. Respondents without asthma were significantly more likely to be continent compared to respondents with asthma.

Table 5.11 presents respondents' results for BMI compared to frequency of self-reported UI. Respondents with an increased BMI had an increased frequency of self-reported UI although these differences were not significant. Figures 5.2 to 5.3 in this chapter are graphs of tables shown in Supplementary Tables, Appendix N (Tables 2 to 3). Figure 5.2 shows that the frequency of respondents who were continent decreased and the frequency of UI increased with increased gestation. Figure 5.3 demonstrates the same result with increased parity. Figure 5.4 demonstrates that respondents with a higher frequency of levels of general exercise have a lower frequency of UI. Figure 5.5 demonstrates that the frequency of self-reported UI showed a similar trend among respondents who spoke LOTE at home compared to respondents who spoke English at home. Appendix N (Tables 4 and 5; Figures 1 and 2) demonstrates that respondents' levels of self-reported general exercise decreased with increased gestation and parity.

Table 5.10.

*Respondents' Levels of Self-Reported Urinary Incontinence Compared to Asthma*

| | | Medical condition | | |
|---|---|---|---|---|
| Self-reported UI n(%) | Respondents (n = 633) | Non-asthmatics (n = 571) | Asthmatics (n = 62) | Fisher's Exact *p*-value |
| Never | 293 (46.2) | 274 (48.0) | 19 (30.6) | .008 |
| <1/week | 175 (27.6) | 153 (26.8) | 22 (35.5) | * |
| >1/week | 82 (13.0) | 70 (12.3) | 12 (19.4) | * |
| Daily | 53 (8.4) | 47 (8.2) | 6 (9.7) | * |
| Don't know | 13 (2.1) | 11 (1.9) | 2 (3.2) | |
| Missing | 17 (2.7) | 16 (2.8) | 1 (1.6) | |

*Note.* *Data demonstrates equality of results or statistical analysis is not applicable.

Table 5.11.

*Respondents' Body Mass Index Compared to Frequency of Self-Reported Urinary Incontinence*

| | BMI (n = 530) | | | |
|---|---|---|---|---|
| Self-reported UI n(%) | Normal (n = 330) | Overweight (n = 107) | Obese (n = 93) | Fisher's Exact *p*-value |
| Never | 164 (49.7) | 47 (43.9) | 42 (45.2) | .090 |
| <1/week | 85 (25.8) | 31 (29.0) | 27 (29.0) | * |
| >1/week | 40 (12.2) | 17 (15.9) | 15 (16.1) | * |
| Daily | 28 (8.5) | 9 (8.4) | 5 (5.4) | * |
| Don't know | 5 (1.5) | 3 (2.8) | 4 (4.3) | |
| Missing | 8 (2.3) | | | |

*Note*. *Data demonstrates equality of results or statistical analysis is not applicable.

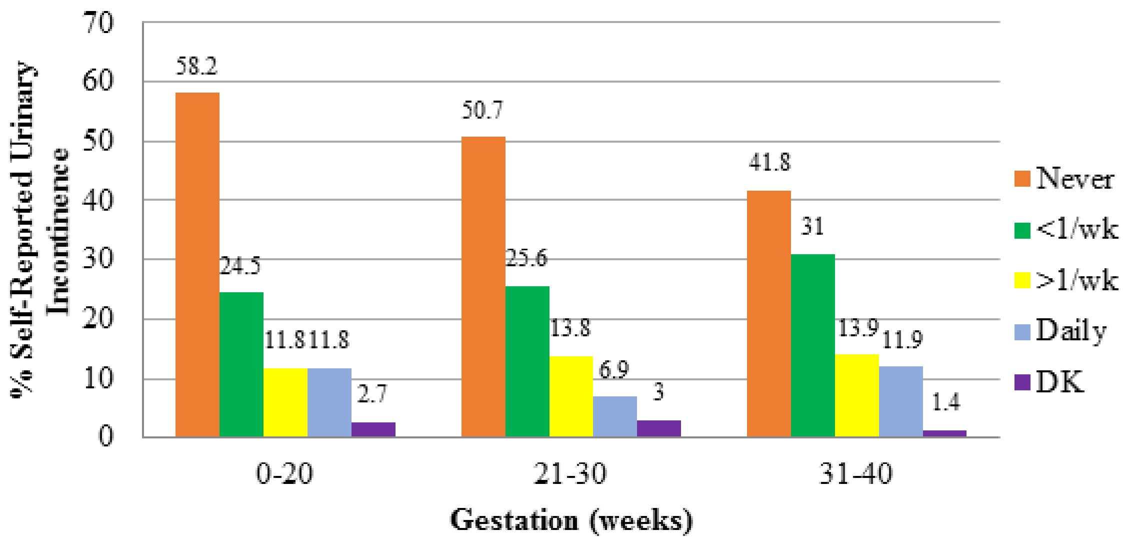



Figure 5.2. Comparison of gestation with frequency of self-reported urinary incontinence.

*Note*. DK = don't know.

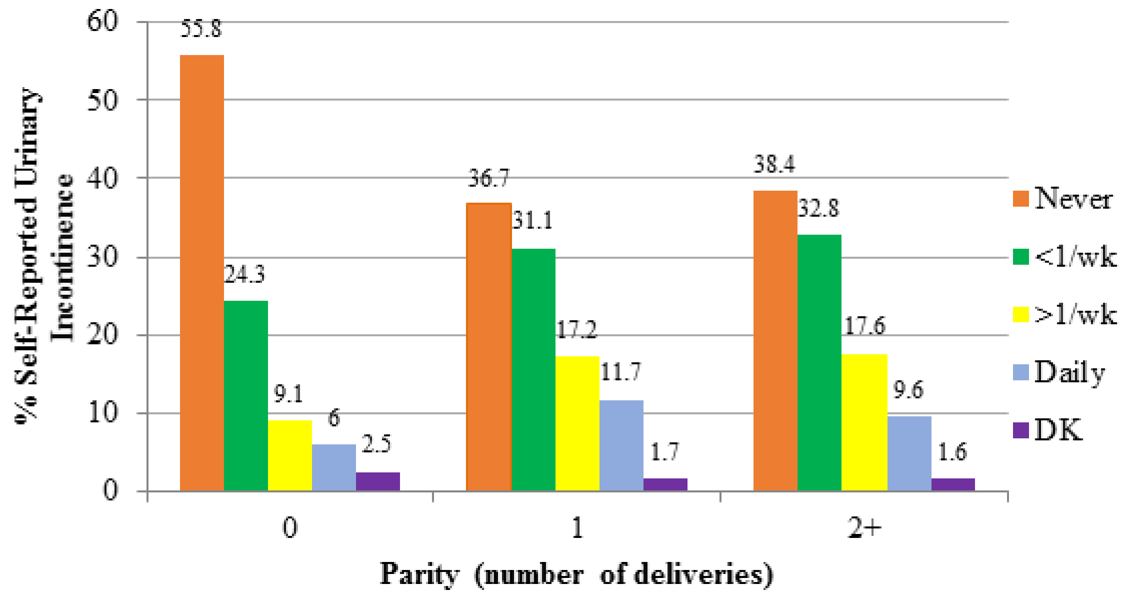



Figure 5.3. Comparison of parity with frequency of self-reported urinary incontinence.

*Note*. DK = don’t know.

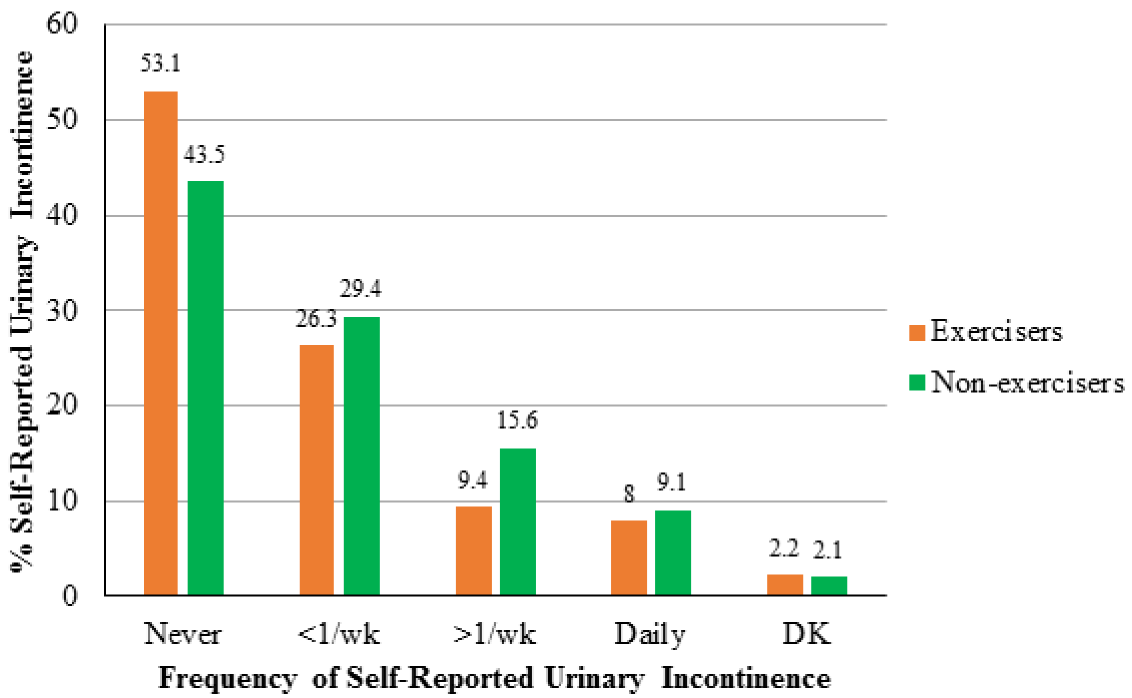



Figure 5.4. Comparison of levels of self-reported general exercise with self-reported urinary incontinence.

*Note*. DK = don't know.

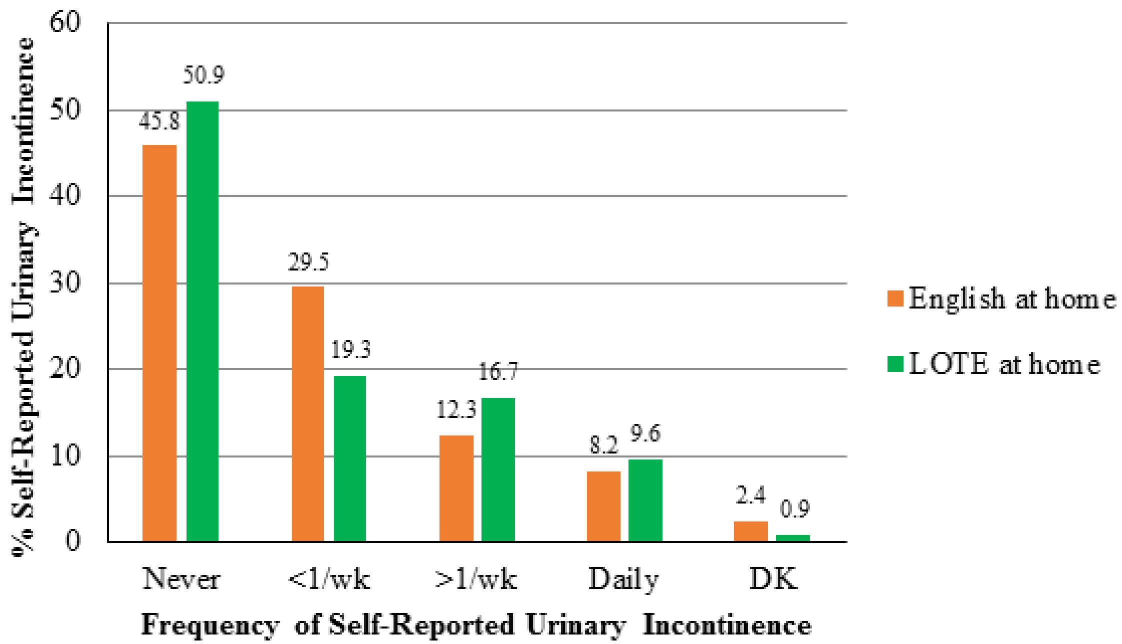



Figure 5.5. Comparison of language spoken at home with frequency of self-reported urinary incontinence.

*Note*. DK = don't know.

## 5.26 Respondents' Internet usage for pregnancy-related information and web-based antenatal education.

Table 5.12 presents responses to usage of the Internet during the antenatal period. Primiparae respondents were significantly more likely to use the Internet to seek pregnancy-related information during pregnancy compared to multiparae respondents. Primiparae respondents were significantly more likely to look for topics relating to safe exercises during pregnancy; bowel information; care of the baby; and labour during pregnancy than multiparae respondents.

Primiparae respondents were significantly more likely to be willing to engage in web-based ANE compared to multiparae respondents. Respondents who spoke LOTE were significantly more likely to be willing to engage in web-based ANE compared to English speaking respondents [LOTE, n = 70 (61.4%); English, n = 227 (44.4%); $p$ = .003]. Responses indicated that 300 (47.4%) of the respondents would be willing to engage in web-based ANE instead of attending ANE face-to-face. Women's responses regarding Internet usage if they were primiparae and spoke LOTE at home are presented in full in Appendix N (Table 6).

Table 5.12.

*Respondents' Internet Usage During the Antenatal Period for Pregnancy-Related Topics*

| Internet usage | Respondents (n = 633) | Parity (0) (n = 317) | Parity (>0) (n = 305) | Fisher's Exact *p*-value |
|---|---|---|---|---|
| Internet usage during current pregnancy for pregnancy-related information[a] n(%) | | | | |
| Yes | 508 (80.3) | 277 (87.4) | 227 (74.4) | < .001 |
| No | 98 (15.5) | 26 (8.2) | 72 (23.6) | * |
| Missing | 23 (3.6) | 12 (3.8) | 4 (1.3) | |
| Topics searched on Internet during current pregnancy[b] n(%) | | | | |
| Pelvic floor muscles | 87 (13.7) | 51 (16.1) | 36 (11.8) | * |
| Safe exercises during pregnancy | 297 (46.9) | 136 (42.9) | 69 (22.6) | < .001 |
| Back pain | 19 7(31.1) | 116 (36.6) | 81 (26.6) | * |
| Bladder | 52 (8.2) | 28 (8.8) | 24 (7.9) | * |
| Bowel | 82 (13.0) | 57 (18.0) | 25 (8.2) | .005 |
| Care of baby | 244 (38.5) | 173 (54.6) | 69 (22.6) | < .001 |
| Labour | 295 (46.6) | 188 (59.3) | 106 (34.8) | < .001 |
| Other topics | 154 (24.3) | 74 (23.3) | 78 (25.6) | * |
| Missing | | 14 (4.4) | 7 (2.3) | |
| Other topics[b] n(%) | | | | |
| Stages of pregnancy | 102 (16.1) | 53 (16.7) | 48 (15.7) | * |
| Health related to baby | 12 (1.9) | 6 (1.9) | 5 (1.6) | * |
| Health related to pregnant woman | 36 (5.7) | 19 (6.0) | 17 (5.6) | * |
| Missing | 47 (7.4) | 18 (5.7) | 21 (6.9) | |

Table 5.12. (continued)

*Respondents' Internet Usage During the Antenatal Period for Pregnancy-Related Topics*

| Internet usage | Respondents (n = 633) | Parity (0) (n = 317) | Parity (>0) (n = 305) | Fisher's Exact *p*-value |
|---|---|---|---|---|
| Willing to use the Internet for ANE n(%) | | | | |
| Yes | 300 (47.4) | 188 (59.3) | 110 (36.1) | < .001 |
| No | 182 (28.8) | 59 (18.6) | 116 (38.0) | * |
| Don't know | 131 (20.7) | 66 (20.8) | 64 (21.0) | |
| Missing | 20 (3.1) | 4 (1.3) | 15 (4.9) | |

*Note.* *Data demonstrates equality of results or statistical analysis is not applicable.

[a]Don't know < 1.0% so not included.

[b]More than one answer.

### 5.27 Respondents' consultation with a physiotherapist during pregnancy.

Table 5.13 presents responses to items that measured consultations with a PT. Of the 51 respondents who had consulted PT for back pain, 13 (25.5%) of these respondents knew that a role of the PFM is to assist to support their back (See Table 5.6), seven (13.7%), respondents didn't know what role the PFM performed and 47 (92.2%) knew PFM prevented or reduced leakage of urine.

Table 5.13.

*Respondents' Consultation with a Physiotherapist During Pregnancy*

| Seen by a physiotherapist n(%) | Respondents (n = 633) |
|---|---|
| Yes | 77 (12.2) |
| No | 522 (82.4) |
| Don't know | 10 (1.6) |
| Missing | 25 (3.8) |
| Reason the physiotherapist was consulted n(%) | |
| Back pain | 51 (8.0) |
| Urinary incontinence | 6 (0.9) |
| Other[a] | 20 (3.2) |

[a]Included fractures, varicose veins, pain in shoulders, ribs and wrist and education on transcutaneous electrical nerve stimulation for use during labour.

## 5.30 Discussion

This is the first large cross-sectional survey of pregnant women (n = 633) in WA undertaken by a PT that has evaluated the awareness and knowledge of PFM and engagement in PFME; attendance at ANE; the frequency of self-reported UI; the usage of the Internet during the antenatal period and which pregnancy-related topics are sought on the Internet. A higher percentage of respondents were in the mid SES range (quintile 111) and a lower number of respondents were in the low SES range (quintiles 1 and 11) compared to the DOHWA data. This disparity may be explained because respondents were from private and public hospitals and women attending private hospitals are likely to have a higher SES (Australian Bureau of Statistics, 2013b). The respondents who spoke English were skewed towards a higher SES than the respondents who spoke LOTE but the respondents who spoke LOTE reported a higher level of education than the English speaking respondents. Recently arrived migrants in Australia have higher levels of education than people who emigrated more than 10 years ago (Massey & Parr, 2012).

Major features of this study population were the high number of women who spoke LOTE and whose place of birth was Asia. One hundred and twenty four (19.6%) respondents were born in Asia which was almost double the data from DOHWA (10.8%). According to the Australian Bureau of Statistics, 40% to 49% of migrants in WA, and migrants born in the Asian countries of Malaysia, China, Vietnam and India live in the suburbs which are in the catchment areas for women delivering babies at Swan Districts Hospital and Osborne Park Hospital or Bentley Health Service (Australian Bureau of Statistics, 2014). Collecting 74.2% of surveys from these health sites with a high migrant population from Asia resulted in a high number of respondents being born in Asia and a high number of women 114 (18%) who responded that they spoke LOTE at home. According to the 2011 Australian census 18% of people responded that they spoke LOTE at home (Australian Bureau of Statistics, 2013a) which demonstrates that the respondents were a representative sample of the population of Australia.

### 5.31 Awareness and knowledge of pelvic floor muscles and pelvic floor muscle exercises; engagement, belief about and sources of information on pelvic floor muscle exercises.

Pregnant women who spoke English were significantly more likely to be aware of PFM compared to women who spoke LOTE whether they were primiparae or multiparae with the differences being between 43% and 49%. Also women who spoke LOTE were significantly less likely to attend ANE. Previous research has shown that women who spoke LOTE were more likely to have a lower educational background and lower SES and these groups have been shown to be less likely to have received information on PFME (Whitford et al., 2007a). Additionally research has demonstrated women from lower SES; lower educational backgrounds; and primiparae are less likely to have attended ANE (Fabian et al., 2004, 2005; Redman et al., 1991; Whitford et al., 2007a). Guidelines recommend that pregnant women receive education on PFM and PFME during pregnancy (Abrams et al., 2009; Boyle et al., 2012; Hay-Smith et al., 2009; National Collaborating Centre for Women's and Children's Health [UK], 2006; Sahakian & Woodward, 2012). Since PFM education is often included in ANE (Wilson et al., 2014) and women who spoke LOTE were significantly less likely to attend ANE, this would mean they would not have access to this source of education. It appears that pregnant women living in WA are reflecting this correlation, with fewer respondents who spoke LOTE having heard of PFM compared to English speaking respondents.

Information about PFM was most often obtained from midwives (60.4%) while 34.2% of respondents received PFM information from other sources. These findings are supported by previous research (Mason, Glenn, Walton, & Hughes, 2001a; Whitford et al., 2007a) and demonstrate that attending ANE is an important method of gaining knowledge about PFM. The majority of the PFM information received from “other sources”, (52.5%), was reported by respondents to have been received from family and friends. Historically, pregnancy-related information was received from families and the local communities (Svensson et al., 2006) but it is now recommended that education on PFM is facilitated by a skilled tutor (Freeman & Monga, 2009; Newman et al., 2010).

Attendance at ANE was also associated with knowledge about anatomy and function of PFM (See Table 5.4) which is supported by previous research (Mason et al., 2001a; Whitford et al., 2007a). Respondents who were multiparae or had attended ANE had significantly more knowledge of the role of the PFM, compared to primiparae women or women who had not attended ANE. While 481 (76.0%) respondents were clear that PFM play a role in preventing UI, fewer respondents (11.4%) were aware that the PFM play a role in supporting the back. Only 27% of respondents knew that PFM prevent or reduce faecal incontinence. Respondents who had attended ANE also had the highest response rate of 73.6% for recommending that PFME were practised daily. These findings are supported by other studies where knowledge of PFME was reported to be lower in primiparae respondents compared to multiparae respondents and attendance at ANE was associated with knowledge of PFME (Whitford et al., 2007a). Knowledge of PFM and PFME and understanding their role in preventing UI would be necessary in order to encourage women to undertake a change in behaviour and practise PFME (Bandura, 2004; Prochaska & Velicer, 1997; Rosenstock, 1974a), according to the behaviour change theories discussed in Chapter 2 (Section 2.50). Awareness and knowledge of the role of PFM and PFME may assist women to be proactive in knowing where and when to seek help related to PFM dysfunction.

Low numbers of women were practicing PFME, despite reporting high motivation to practise PFME. There were over 80% of respondents (Table 5.5) who believed that they would do PFME if advised but responses indicated (Table 5.3) that 56.9% of respondents had exercised their PFM and 11.4% of respondents were currently doing PFME. There was a significant difference between respondents who spoke LOTE and those who spoke English for the practise of PFME in both primiparae and multiparae respondents with English speaking respondents reporting increased practise of PFME. There was also a significant increase in likelihood of respondents who practised PFME having attended ANE compared to respondents who were not practicing PFME. Whitford (2007a) who found that 54% of pregnant women at antenatal clinics had practised PFME in the previous month but only 15.6% of women (Mason et al., 2001a) had received physical instruction on PFME. Younger women and lower SES were less likely to practise PFME (Whitford et al., 2007a) but there was no difference in practise of PFME and parity. Attendance at ANE was also associated with practise of PFME (Whitford et al., 2007a) in agreement with the present research (Table 5.6) so encouraging pregnant women to attend ANE is an important component of antenatal care.

### 5.32 Antenatal education.

Respondents from a high SES or with tertiary education were significantly more likely to report that they were planning to attend ANE and respondents with tertiary education were significantly more likely to have attended ANE compared to respondents who did not have a tertiary education or were from a middle or lower SES. This reflects previous research (Fabian et al., 2004, 2005; Redman et al., 1991; Whitford et al., 2007a). Respondents who had attended ANE had significantly more knowledge about the function and anatomy of PFM; and practised PFME compared to respondents who had not attended ANE. However, since fewer than 50% of pregnant women had attended ANE those women who were unable or unwilling to attend ANE may be more a risk of developing PFM dysfunction or resulting UI. These data were supported by the findings in Phase 1 of this research as presented in Chapter 4 (Wilson et al., 2014); and the results of a survey in New South Wales, which reported that 35% of pregnant women attended ANE and that 88% percent of the women who attended ANE were primiparae (Lee & Shorten, 1999). The demographic characteristics of respondents speaking LOTE, being lower SES and migrant, could partly account for the low attendance of respondents who spoke LOTE at ANE when ANE is readily available throughout WA at the DOHWA sites with maternity services. Recommendations are that pregnant women attend ANE (Banta, 2003) and that attendance at ANE is helpful (Fabian et al., 2005; Svensson et al., 2009). It may be that changes in services so that ANE becomes more accessible is required. The gap between women planning to attend ANE and actually attending was between 30% and 40% indicating that more research is also needed to establish why so many women report that they planned to attend ANE but did not.

### 5.33 Respondents' frequency of self-reported urinary incontinence.

Survey respondents reported high levels of UI which highlights a common problem, with almost 50% of women reporting UI during pregnancy. Respondents in the latter weeks of gestation and those with increased parity also reported that they experienced UI (Figures 5.2 and 5.3). These results are supported by other large studies which have reported the prevalence of UI to be as high as 54.3% (Whitford et al., 2007b) and that the frequency of UI increases with parity and gestation (Chiarelli & Brown, 1999; Haslam, 2005b; Phillips & Monga, 2005; S L Wesnes et al., 2007). Respondents who had asthma (repeated coughing) and high BMI also were significantly more likely to report UI than those women without medical conditions, in keeping with other large studies that have reported these associations (Abrams et al., 2010; El-Hefnawy & Wadie, 2011; Hrisanfow & Hagglund, 2011; Subak et al., 2009; S L Wesnes et al., 2007).

It was of concern that 207 (32.6%) respondents were unaware that treatment for UI is available during of pregnancy. Additionally, as women may become embarrassed discussing UI (Chiarelli et al., 1999) the prevalence of self-reported UI is likely to be higher than the findings in the literature which is clearly possible given that respondents were unaware that treatment for UI is available during pregnancy. It may be important to remind health professionals consulting any pregnant women including those who provide ANE, but particularly women with medical conditions that increase the risks of developing UI, to make enquiries about UI and recommend referral to the appropriate health professional.

### 5.34 Use of the Internet regarding pregnancy-related topics.

Over 80% of respondents (Table 5.12) stated that they had used the Internet to seek pregnancy-related information during their pregnancy with a significantly higher number of primparae women (87.4%), both from LOTE and English speaking backgrounds, seeking information compared to multiparae women (74.4%). Previous research demonstrated that between 84% (Larsson, 2009) and 95% of pregnant women have sought pregnancy-related information from the Internet (Lima-Pereira et al., 2012).

However, nearly one quarter of respondents reported having heard of PFM from the Internet, which has not been established in previous studies.  Another study found that midwives were the most frequent health professional to give information on PFME to pregnant women, whilst only 8.4% of women received PFME information from PT (Whitford et al., 2007a).  This suggests that looking for PFME on the Internet may be an emerging area that would be useful for PT and midwives to use and may increase the awareness, knowledge and practise of PFME in pregnant women.

Almost half (47.4%) of the respondents indicated that they would attend web-based ANE classes (Table 5.12).  The increased positive response for attending web-based ANE by LOTE respondents (Appendix N, Table 6) may be because the LOTE women could participate in the ANE in their preferred language rather than in English.  Lothian (2008) envisaged ANE courses being developed and presented using Webinars and interactive web-sites for the purpose of encouraging women to participate in ANE and therefore access relevant pregnancy-related information from childbirth educators.  The high response rate to attending web-based ANE indicates that more research on web-based pregnancy-related education and developing Webinars is recommended so that high quality web-sites in English and LOTE and can be made available for recommendation to pregnant women (Vicary & McKenna, 2006).

The two most common topics searched for on the Internet by respondents (Table 5.12) were safe exercises during pregnancy (46.9%) and aspects of labour (46.6%).  These are two topics often taught by PT at ANE (Wilson et al., 2014) and the results demonstrate the strong interest by pregnant women in these areas.  When comparisons were made between LOTE and English speaking primiparae respondents (Appendix N, Table 6) a higher percentage of the LOTE respondents had sourced information from the Internet on care of baby, safe exercises, back pain and the bladder than English speaking respondents.  English speaking respondents had sourced information on labour more frequently than LOTE respondents.  Such data suggests that perhaps LOTE respondents may still learn about labour from their extended families and local communities

(Svensson et al., 2006) although guidelines recommend education from evidence-based sources.

Analysis of data showed that 102 (66.2%) respondents searched for information on the stages of pregnancy, whilst 71.6% of English speaking primiparae respondents and 100% of LOTE primiparae respondents searched for this information. These data suggest that either LOTE respondents are interested in gleaning more information on pregnancy or that they are more computer literate. The Continence Foundation of Australia (Continence Foundation of Australia, 2013) recently released an App. Recommending the use of the PFME Safe App at clinic appointments and in written information may be another method of providing web-based PFM education and as a reminder to participate in a PFME programme.

Data on what stage of pregnancy women accessed the Internet were not collected in the present trial. Women looked for information on the Internet more frequently in the early stages of pregnancy (Larsson, 2009). Whether LOTE respondents sourced information in LOTE were also not collected. Therefore, conclusions could not be drawn as to why there was an increased frequency of respondents who spoke LOTE sourcing some topics and additionally willing to use the Internet for ANE compared to women who spoke English at home.

A Swedish study (Larsson, 2009) noted that women were not necessarily able to determine if the information accessed on the Internet was accurate. In order to ensure that women are accessing evidence-based information, health professionals could play a role in recommending reliable web-sites to pregnant women during clinic appointments and ANE classes. More research is needed to evaluate provision of web-based pregnancy-related education.

### 5.35 Consultation with a physiotherapist during pregnancy.

There were 57 (9%) (respondents who consulted PT during their pregnancies for UI or back pain (Table 5.13). Of note is that 28.1% of respondents who had consulted PT answered “don’t know” to the location of their PFM. Whether respondents were not given education on PFM, the education was poorly taught, or the respondents did not assimilate the information, cannot be established from the present research but warrants further investigation. Of the respondents who consulted PT, 92.2% were aware that PFM prevent or reduce UI which is on a par with 91.5% of respondents who have attended ANE and higher than the responses from primiparae women and non-attenders at ANE. Only 42.4% of the respondents seen by PT knew that that the reason pregnant women leaked urine is due to PFM dysfunction which is on a par with the attenders at ANE and higher than respondents in the other groups. These results indicate that pregnant women who attend ANE or consult with PT attain knowledge on PFM function and basic anatomy. It may be important to examine whether PT can play a larger role in ANE as a means of providing PFM education, especially for women who are unable to attend ANE but may be able to attend an individual or group appointment with a PT.

### 5.40 Strengths and Limitations

To the author’s knowledge, these are the first data from WA to evaluate the levels of self-reported general exercise; the frequency of self-reported UI; usage of the Internet and pregnancy-related topics sought on the Internet; and willingness to use the Internet for ANE. The data related to the number of pregnant women who stopped smoking during pregnancy were not available at the commencement of the present study in 2012 but is currently collected by DOHWA (Hutchinson & Joyce, 2014). The survey response was nearly twice the sample size required if a true representative sample of pregnant women was to be obtained. The research obtained detailed and comprehensive data that provided health information about pregnant women including their knowledge of PFM and PFME, self-reported UI and their feedback about ANE. It was not ethically possible or practical within the DOHWA to obtain a list of all pregnant women and generate a completely representative sample, however seven sites were approached using face-to-face surveys. Mail outs were delivered to six sites and data were collected from 25 sites. The sample characteristics were carefully compared and differed in some respects from the DOHWA in that 439 (69.4%) respondents were planning to deliver in the NMHS but the sample was still largely representative of pregnant women in WA.

These data while specific to WA, were collected in a health system that is similar to other states in Australia and developed countries. Hence these results may be useful to inform those other health systems. Having two linguistically diverse groups of respondents enabled comparisons between the groups for awareness and knowledge of PFM; engagement in PFME; attendance at ANE; usage of the Internet; and pregnancy-related topics sought on the Internet.

There were some missing data for nearly all survey items. A number of respondents failed to answer some items. Women with LOTE background were more likely to leave items unanswered, possibly due to language difficulty, so it may be that future surveys should be available in other languages to gain these women's responses to topics pertaining to ANE. Lack of responses indicates that the survey could be strengthened in its design format when re-administered although it was piloted prior to the large survey.

### 5.41 Conclusions.

The study surveyed 633 pregnant women living in WA. While 76% of women surveyed were aware the PFM prevent or reduce UI, few women were aware the PFM prevent faecal incontinence and play a role in supporting the back. Low numbers of women were practicing PFME, despite reporting high motivation to practise PFME. There was a high frequency of self-reported UI with 49% of respondents reporting UI during pregnancy. Fewer than 50% of women attended ANE, despite ANE being readily available. Greater than 80% of respondents used the Internet to seek pregnancy-related information and almost 50% of respondents were willing to use the Internet for ANE (particularly LOTE women). Given that a high number of respondents planned to attend ANE but fewer than 50% actually attend ANE more research is needed to establish why women do not attend ANE, including research into new methods of providing ANE.

# CHAPTER 6

## Phase 2: Study 2 – Evaluating the Effect of Web-Based Pelvic Floor Muscle Education: Pilot Randomised Controlled Trial

### 6.10 Introduction

Studies that describe or evaluate physiotherapy-related education during ANE or in the antenatal period are limited. Web-based education has been demonstrated to be effective in other areas of health but web-based PFM education during the antenatal period for primiparae women has not yet been evaluated. Chapter 6 describes a RCT that was conducted to evaluate the effect of providing a novel web-based PFM education programme to primiparae women.

#### 6.11 Aims.

The primary aims of the study were to:

1. Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on awareness and knowledge of PFM and PFME in primiparae women compared to usual antenatal care alone;

2. Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on confidence in and belief about engaging in a PFME programme compared to usual antenatal care alone;

3. Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on adherence to a PFME programme compared to usual antenatal care alone.

### 6.20 Methods

The design was a two-group pilot RCT with participants uninformed as to whether they were in the intervention or control group. The present study was based on recommended guidelines for conducting pilot studies (Thabane et al., 2010). A definition of a pilot study (National Institute for Health Research, 2014; Thabane et al., 2010) is that it is a smaller version of a future main study to assess the feasibility of conducting a main trial.

### 6.21 Participants and setting.

Pregnant women were recruited in WA and all participants were primiparae and between 22 to 27 weeks' gestation. The setting (Section 3.30) and complete inclusion criteria (Section 3.40) for the study were described in detail in Chapter 3.

### 6.22 Randomisation.

A computer-generated, random number schedule was produced (Portney & Watkins, 2009) and placed in opaque, consecutively numbered envelopes by a research assistant who was not involved in the trial (CONSORT, 2010). The randomisation envelopes were stored at The University of Notre Dame Australia (Fremantle Campus). On completion of the baseline assessment (Appendix C), the researcher telephoned or met with the assistant and asked for a number, in order of recruitment, to be allocated to the participant. Participants were allocated to one of two groups, either the intervention group or the control group. After the participant was enrolled, the researcher emailed the participant the instructions relevant to their group allocation. Participants were not informed if they were in the control or intervention group. All participants were advised in the PLS (Appendix A) that they may be asked to view a five minute education session at about 22 - 26 weeks' pregnant and that some participants would also be asked to participate in a short interview. The participants in the intervention group were made aware that the online link to the PFM programme contained education designed to assist them during pregnancy.

#### *Intervention conditions.*

The intervention was described in detail in Chapter 3 (Section 3.60) and consisted of a web-based PFM education programme which included an online printable "tips" sheet (Appendix K) and a semi-structured interview (Appendix I) conducted by telephone. All participants in the intervention group continued to receive usual antenatal care during pregnancy.

***Control conditions.***

Participants continued to receive usual antenatal care during pregnancy. Usual antenatal care consisted of attending antenatal appointments; ANE classes if desired; consultation with health workers such as doctors, midwives and PT; reading books; searching online; and asking family and friends for information relating to PFM and PFME.

**6.23 Outcome measures.**

An overview of the OM for Phase 2 of this research was presented in Chapter 3 (Section 3.70), Table 3.4.

The primary outcomes measured at baseline (between 22 to 27 weeks' gestation) and at follow-up [35 weeks' (+/- 1) gestation] were:

1. Participants' awareness and knowledge of PFM measured using questionnaires (Appendices C and G);
2. Participants' confidence in and belief about engaging in PFME measured using questionnaires (Appendices C and G);
3. Participants' adherence to a PFME programme measured using questionnaires (Appendices C and G) and a participant diary (Appendix J).

There was an additional post-education questionnaire (Appendix H) for the intervention group implemented, as part of the education programme, immediately after they had watched the web-based PFM education intervention. The questionnaire was designed to measure changes in participants' levels of knowledge between baseline and immediately after watching the web-based PFM education programme. Semi-structured interviews (Appendix I) by telephone were also used to explore the intervention group participants' perceptions of the web-based education intervention.

Additional outcomes measured were:

4. at baseline, the demographics of participants; self-reported smoking habits; and amenability of engaging in web-based ANE;
5. at baseline and follow-up were medical conditions of participants; self-reported UI; self-reported levels of general exercise; access to physiotherapy services; attendance at ANE; knowledge of available treatment for UI; pregnancy-related usage of the Internet;
6. at follow-up only, participants' self-reported UI measured with a participant dairy and whether participants accessed services for treatment of UI. At follow-up extra information was requested on LUSCS as the intention to have a LUSCS has been shown to be associated with being less likely to engage in PFME (Bo, Owe, & Nystad, 2007).

Feasibility outcomes measured were:

7. The number of participants in either the control or intervention group who dropped out after enrolment into the study measured at baseline and at follow-up and immediately after watching the web-based PFM education intervention (for participants in the intervention group only);
8. The number of participants who withdrew measured at baseline and at follow-up and immediately after watching the web-based PFM education intervention (for participants in the intervention group only);
9. Participants' perceptions of the intervention measured in the semi-structured interviews by telephone post-education and at follow-up;
10. The number of participants who completed the whole trial.

### 6.24 Data collection instruments.

The Pre-Intervention Questionnaire (Appendix C) is described in Chapter 3 (Section 3.90) and Chapter 5 (Section 5.12 for items and OM). The Post-Education Questionnaire (Appendix H) was administered to the intervention group only and consisted of 17 items, designed to measure outcomes relevant to the delivery of the web-based PFM education intervention. This included measuring participants' levels of knowledge about PFM, planned adherence to a PFME programme, their immediate feedback on whether they would recommend the education programme to other people, and suggestions for improvements to the content and delivery of the education intervention.

The Final Post–Intervention Questionnaire (Appendix G) consisted of 41 items. The questionnaire was emailed at 35 weeks' (+/- 1) gestation. The items measuring participants' knowledge and beliefs of PFM and PFME were similarly worded to the Pre-Intervention Questionnaire (Appendix C). Participants were asked to provide responses about ANE, usage of the Internet relating to pregnancy-related Apps and feedback on the web-based PFM education programme. Items 10 and 11 measured participants' levels of intention and knowledge of availability of ANE. Items 12 to 18 measured participants' response to the web-based PFM education programme. Measurements of levels of awareness and knowledge of PFM and PFME were measured in items 19 to 23; participants' knowledge of UI and beliefs for seeking treatment for UI and levels of self-reported UI by items 24 to 27; confidence in and belief about undertaking PFME and their beliefs about the effects of PFME on UI in items 28 to 37, 40 and 41. Items 38 and 39 measured the strategies used as reminders to undertake PFME. The questionnaire had selected items that allowed verbatim responses on the web-based education and reminders to do the PFME.

Semi-structured interviews (Appendix I) were administered by telephone to explore outcomes relevant to the delivery of the intervention one month after watching the web-based PFM education intervention. This included gaining the participants' views about engaging in web-based PFM education thus enriching the results of the quantitative data. The researcher made a telephone call to the participant and asked if the time was convenient for the interview. If the time was inconvenient another time was chosen for the researcher to re-contact the participant. The interviewer used the telephone call to give the participants an opportunity to ask clarifying questions (Britten, 2006; C. S. Carpenter, 2013; Creswell & Plano Clark, 2007). The interviews consisted of six semi-structured questions designed to gather information relevant to the web-based PFM programme and designed as separate themes. The items allowed for spontaneity from the participants so that the interviewer could gather extra relevant information but still remain focussed on gathering data relevant to the intervention (Serry & Liamputtong, 2013). The themes measured by each item were: item one measured the levels of participants' perceptions about the quality of the intervention; item two measured levels of implementation of the "knack"; item three measured the levels of participation in PFME; item four measured the levels of usage of the "tips" sheet; item five measured the number of participants' partners who watched the intervention; and item six provided an opportunity for participants to ask questions and make additional comments. During the interview the researcher made notes, formed and noted impressions in order to more accurately remember the responses.

Participant diaries (Appendix J) were used to measure daily adherence to PFME and self-reported frequency of UI. Participants were asked to make daily recordings of the number of repetitions of PFME and the frequency of episodes of UI between enrolment in the study between 22 to 27 weeks' gestation until completion of the trial at 35 weeks' gestation. The participant was requested to record the number of PFME completed per day and whether or not she leaked urine (UI = yes; no UI = no). The use of a diary for data collection to measure levels of adherence to PFME and frequency of self-reported UI has been recommended by previous researchers (Alewijnse, Mesters, et al., 2003) (Locher, Goode, Roth, Worrell, & Burgio, 2001; Wyman, Choi, Harkins, Wilson, & Fantl, 1988) as an effective means of reducing reporting or recall bias (Alewijnse, Mesters, et al., 2003; Neumann et al., 2005b; Peat et al., 2002; Reilly et al., 2002).

### 6.25 Procedure.

Recruitment for the study was described in Chapter 3 (Section 3.52). After allocation to either the control or intervention group, participants were emailed the relevant instructions within 48 hours of assignment and participants in both groups were requested to email the researcher to inform her that they had received the initial email. Non-respondents were reminded, twice by email, then emailed and sent a text which was then followed by another text and then three phone calls. If no response was received after one month, participants were considered lost to follow-up.

Data collection techniques are described in full in Chapter 3 (Section 3.80). An online link to the Post–PFM Education Questionnaire (Appendix H) was included as part of the education intervention. The researcher contacted participants in the intervention group one month after completion of this questionnaire for administration of the semi-structured interviews (Appendix I). The Final Post–Intervention Questionnaire (Appendix G), was emailed at 35 weeks' (+/- 1) gestation (Appendix O). Reasons for collecting responses in this timeframe were to provide a more accurate measure of the frequency of UI because UI increases after 30 weeks' gestation (Sampselle et al., 1998); to give women who delivered pre-term time to complete the questionnaire; and to allow time for the researcher to follow up prior to delivery, if participants had not returned the questionnaire by the requested date.

### 6.26 Statistical analysis.

The overall approach to the statistical analyses is presented in Chapter 3 (Section 3.91). Analyses of data from the pilot RCT were conducted using an intention-to-treat principle. A two-tailed probability ($p < .05$) was calculated. The effect sizes (mean standardised difference) were calculated with 95% confidence intervals for the continuous measures. The items which were answered incorrectly and the drop-out rate were tallied (Portney & Watkins, 2009). Missing data were independent of group allocation and were missing at random. In order to avoid bias, due to only reporting the efficacy for those participants who completed the trial, all missing data were reported. Participants who withdrew due to ill-health were not re-contacted and their data were treated and presented in tables as not applicable instead of being categorised as missing data (M. K. Bulsara, statistician, personal communication, March 5, 2014).

Quantitative data from the questionnaires and participant diaries were coded numerically and entered into Microsoft Office Excel (2007) and then transferred into IBM-SPSS for analysis. Cronbach's coefficient alpha was used to measure internal reliability of the questionnaire items and 0.8 was considered large on the basis of established psychometric norms (Field, 2013; Portney & Watkins, 2009). In the Final Post–Intervention Questionnaire (Appendix G) Cronbach's coefficient alpha was used on 12 items numbered 26 and 28 to 37 and 40 to establish reliability. Item 25 was negatively coded so was excluded from analysis. This ensured that each item contributed appropriately to the final score (Peat et al., 2002).

#### *6.26.1 Quantitative data.*

Demographic data were summarised using descriptive statistics. Participants' responses to items that measured awareness and knowledge of PFM and PFME; how the information on PFM was received; strategies for adherence to PFME; whether additional information on PFME was sought; willingness to attend web-based ANE; responses regarding the web-based PFM education intervention; and responses regarding consultation with a PT were tabulated as binary data. Changes in participants' levels of knowledge of PFM at baseline and follow-up were compared in the control and in the intervention groups using McNemar's test. Changes in the intervention group's level of knowledge of the PFM measured between baseline and immediately post-education; immediately post-education and at follow-up were compared using McNemar's test. The differences between the control and the intervention groups in participants' levels of knowledge of PFM measured at baseline and follow-up were compared using the Cross–tabulations of Chi-square, Fisher's Exact Test. Graphs to show correlations in knowledge levels between groups at baseline and follow-up were generated using Microsoft Office Excel 2007.

Changes in participants' beliefs regarding PFM measured at baseline and follow-up using the Likert-type scale, were compared in the control and intervention groups using the non-parametric Wilcoxon signed-rank test of significance. The differences between the two groups regarding participants' beliefs about PFM measured at baseline and follow-up were compared between the control and intervention groups using the non-parametric Mann Whitney U (Wilcoxon rank sum) test. Graphs to show correlations in confidence and belief levels between groups at baseline and follow-up were generated using Microsoft Office Excel 2007.

Participant diaries were used to measure daily adherence to a PFME programme and daily UI from between 22 to 27 weeks' gestation until 35 weeks' (+/- 1) gestation. Analysis of the daily adherence was compared between the two groups (control and intervention) using the generalised estimating equations (Hanley, Negassa, Edwardes, & Forrester, 2003; McNeil, Newman, & Kelly, 1996), while controlling for known predicted factors (week's gestation, self-reported UI, SEIFA, LOTE, BMI, smoking, education and LUSCS) associated with the primary OM. The frequency of practicing PFME was coded 0 to 6 (0 = not practise PFME; 6 = 60 repetitions of a PFM contraction) for each day into IBM-SPSS spreadsheet and then recoded as a binomial variable (yes/no). The frequency of UI was coded as a binomial variable (continent/incontinent) for each day into IBM-SPSS spreadsheet. A binary logistic generalised estimating equation was conducted with the dependent variable PFME. Each predicted factor was tested separately in the generalised estimating equation with group. The results were presented as odds ratios with the Wald Confidence Interval set at 95%.

#### *6.26.2 Qualitative data.*

Thematic analysis of the qualitative data collected from the semi-structured interviews by telephone was undertaken (Liamputtong & Serry, 2013). The analysis was not a linear process of moving from one phase to the next but was a reflective and iterative process, where movement was back and forth (Braun and Clark 2007). The process of conducting interviews were discussed and refined with the principal supervisor at each stage of the data collection and analyses, to further ensure that the interviewing protocols had been adequately devised and executed.

The researcher first read through the notes from the telephone interviews in order to gain a 'general sense' of the data. The data were then separated into single response items followed by division into units of meaning that were condensed on the basis of the frequency of common words or phrases used by participants. Each question and these data were then colour-coded into predetermined themes as discussed in Chapter 6 (Section 6.24) using the conceptual framework of the questionnaire. The process involved three separate analyses of sorting then resorting to check that each colour-coded response was definitely related to each theme (Pope et al., 2006). In the colour-coded responses there were sub-themes which were numbered (Pope et al., 2006) (Liamputtong & Serry, 2013). For example, when asked about the theme "have you looked at the "tips" sheet?" (Appendix K), participants responded by listing prompts to undertaking PFME which were numbered and became a sub-theme. The identification of sub-themes required careful reading and re-reading of the data. The responses to each sub-theme were counted and converted into percentages for the purpose of comparing total frequencies of results (Pope et al., 2006). Constant descriptive comparisons were undertaken and the results were tabled and displayed using Microsoft Excel (2007) (Liamputtong & Serry, 2013).

Reflexivity is especially pertinent with qualitatively derived data and is enhanced when the researcher has proven expertise with regard to the subject matter being considered (Engestrom, Engestrom, & Karkkainen, 1995). The researcher was therefore, required to bracket throughout the data collection to ensure that the results were not personally biased and that the research process was approached with an open mind (Creswell & Plano Clark, 2007). The process of bracketing is intended to remove the deleterious effects of subjectivity and bias. Since the researcher and the research processes shaped the collection of data, this potentially could have influenced the interpretation of the outcomes. This was managed carefully from the outset of the collection of qualitative data (C. S. Carpenter, 2013; Mays & Pope, 2006). Reflexivity was enhanced because the researcher had proven expertise with regard to the subject matter being considered (Engestrom et al., 1995) and possesses the credibility for facilitating the semi-structured interviews.

### 6.27 Sample size.

The novel web-based PFM education intervention had not previously been tested therefore a statistician was consulted on the number of recommended participants. A sample size (n = 50) was chosen as being adequate to test the intervention (M. K. Bulsara, statistician, personal communication, May 25, 2012). The intervention was also being delivered using an online format and it was known that use of online technology for data collection may result in increased drop-out compared to face-to-face interviews (Granello & Wheaton, 2004); it was also likely that some participants would have pre-term deliveries (Haslam, 2005b). As such, 70 participants were recruited for the study, which included an additional 20 (40%) participants recruited to allow for drop-out. The results from the pilot study would subsequently be available to inform a robust sample size power calculation for a larger study in order to test specific hypotheses (Thabane et al., 2010) upon completion of the present research.

## 6.30 Results

Figure 6.1 shows the participant flow through the study using the CONSORT diagram (CONSORT, 2010). There were 47 (67.1%) participants (22 in the control and 25 in the intervention group) who completed the study.

### 6.31 Intervention delivery.

The delivery of the intervention is also shown in Figure 6.1. The web-based PFM education intervention was emailed to all 35 participants in the intervention group and 27 participants reported watching the intervention; all these participants then completed the Post-Education Questionnaire (Appendix H). None of the participants in the control group received the web-based PFM education intervention. All 70 participants received the participant diary with 12 (34.4%) participants in the control group and 22 (62.9%) in the intervention group completing the diary. There were no reported adverse events attributable to taking part in the study. The 24 participants who were interviewed by telephone reported having watched the video and had completed the Post-PFM Education Questionnaire (Appendix H).

### 6.32 Demographic characteristics.

Table 6.1 presents the demographic characteristics for the participants. The ages of the participants ranged from 24 to 39 years. The intervention group had a higher SEIFA and higher levels of education than the control group. There were differences between the control and intervention groups for the numbers of participants born in Asia and Europe, South & Central America & the Pacific. There were 11 participants who spoke LOTE and these participants all completed the study. The demographic characteristics of the 24 participants who were interviewed and the demographic characteristics of the participants who completed the research are presented in Appendix N (Tables 7 and 8).

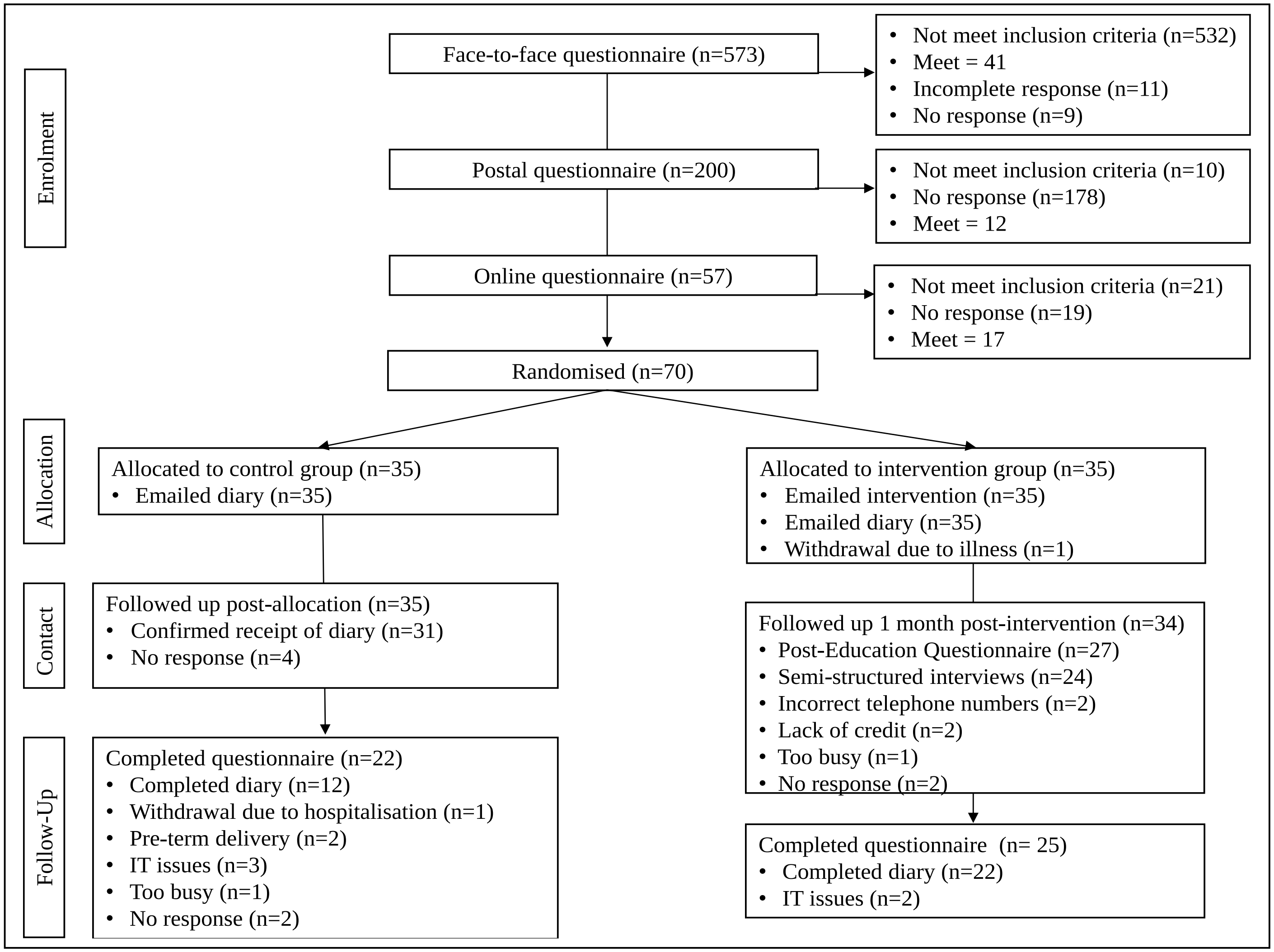



*Figure 6.1.* CONSORT diagram: Participants' flow through the study.

Table 6.1.

*Demographic Characteristics of Participants*

| Characteristic | Control (n = 35) | Intervention (n = 35) |
|---|---|---|
| Age (years), mean ±SD | 28.4 ±5.6 | 29.2 ±4.7 |
| Age (years), median | 28.0 | 29.0 |
| Marital status n(%) | | |
| Married/De facto | 34 (97.1) | 35 (100.0) |
| Single | 1 (2.9) | |
| SEIFA quintiles[a] n(%) | | |
| 1(low SES) | 1 (2.9) | 1 (2.9) |
| 2 | 3 (8.6) | |
| 3 | 12 (34.3) | 11 (31.4) |
| 4 | 8 (22.8) | 7 (20.0) |
| 5 (high SES) | 11 (31.4) | 16 (45.7) |
| Education level completed[b] n(%) | | |
| University | 12 (34.3) | 18 (51.5) |
| TAFE | 12 (34.3) | 7 (20.0) |
| Year 12 | 9 (25.7) | 6 (17.1) |
| Year 10 | 2 (5.7) | 4 (11.4) |
| Receipt of government assistance[c] n(%) | | |
| No | 33 (94.3) | 30 (85.7) |
| Yes | 2 (5.7) | 3 (8.6) |
| Don’t know | | 2 (5.7) |
| Intended site of delivery n(%) | | |
| Metropolitan | 32 (91.4) | 32 (91.4) |
| Country | 3 (8.6) | 3 (8.6) |

Table 6.1. (continued)

*Demographic Characteristics of Participants*

| Characteristic | Control (n = 35) | Intervention (n = 35) |
|---|---|---|
| Country of birth n(%) | | |
| Australia & New Zealand | 24 (68.6) | 20 (57.1) |
| United Kingdom & Ireland | 6 (17.1) | 3 (8.6) |
| Asia | 3 (8.6) | 6 (17.2) |
| Other Europe, South & Central America & Pacific (inhabitants speak LOTE) | 2 (5.7) | 2 (5.7) |
| South Africa, Zimbabwe, North America (inhabitants speak English) | | 4 (11.4) |
| Language spoken at home n(%) | | |
| Languages other than English | 4 (11.4) | 7 (20.0) |
| English | 31 (88.6) | 28 (80.0) |
| Identifies as ATSI[d] n(%) | | |
| Yes | 1 (2.8) | 2 (5.7) |
| Missing | 1 (2.8) | |

[a]Chi-square test was not significant ($\chi^2$ = 4.0 $p$ = .401).

[b]Chi-square test was not significant ($\chi^2$ = 4.44 $p$ = .349).

[c]Payments due to ill health, low income or unemployment.

[d]Aboriginal and Torres Strait Islander women.

**6.33 Medical conditions, self-reported general exercise and smoking habits.**

Table 6.2 presents the responses of the participants regarding gestation, BMI, medical conditions, self-reported UI, self-reported general exercise and smoking habits that were measured at baseline and at follow-up. The responses for participants who completed the research regarding interview participation, diary completion, medical conditions and self-reported general exercise are presented in Appendix N (Table 9).

Table 6.2.

*Gestation, Body Mass Index, Medical Conditions, Self-Reported Urinary Incontinence, Self-Reported General Exercise and Smoking Habits of Participants*

| | Control | | Intervention | |
|---|---|---|---|---|
| Characteristic | Baseline (n = 35) | Follow-up (n=22) | Baseline (n = 35) | Follow-up (n=25) |
| Gestation | | | | |
| Mean (weeks) $\pm$(SD) | 21.0 $\pm$4.3 | 35.3 $\pm$1.0 | 20.0 $\pm$4.1 | 35.6 $\pm$1.5 |
| Median (weeks) (IQR) | 22.0 (7.0) | 35.0 (0.0) | 19.0 (7.0) | 35.0 (2.0) |
| Planned to have a LUSCS n(%) | | | | |
| Yes | | 1 (2.9) | | 2 (5.7) |
| No | | 16 (45.8) | | 18 (51.4) |
| Don't know | | 5 (14.3) | | 5 (14.3) |
| Missing | | 13 (38.0) | | 10 (28.6) |
| Medical conditions[a] n(%) | | | | |
| No medical condition | 22 (62.9) | | 24 (68.6)) | |
| Asthma/cough | 5 (14.3) | | 3 (8.6) | |
| Irritable Bowel Syndrome | 1 (2.9) | | 2 (5.7) | |
| Constipation | 2 (5.7) | | | |
| Other | 3 (8.6) | | 3 (8.6) | |
| Missing | 2 (5.7) | | 3 (8.6) | |
| BMI[b] n(%) | | | | |
| BMI, median (IQR) | 24 (3.3) | 35.8 (8.0) | 22.0 (6.5) | 33.7 (7.3) |
| Normal (< 25.0) | 24 (68.6) | | 24 (68.6) | |
| Overweight (25.0 to 29.9) | 5 (14.3) | | 7 (20.0) | |
| Obese (> 29.9) | 4 (11.4) | | 4 (11.4) | |
| Missing[c] | 2 (5.7) | | | |

Table 6.2. (continued)

*Gestation, Body Mass Index, Medical Conditions, Self-Reported Urinary Incontinence, Self-Reported General Exercise and Smoking Habits of Participants*

| | Control | | Intervention | |
|---|---|---|---|---|
| Characteristic | Baseline (n = 35) | Follow-up (n=22) | Baseline (n = 35) | Follow-up (n=25) |
| Self-reported smoking habits during pregnancy n(%) | | | | |
| No | 29 (82.8) | | 31 (88.6) | |
| Stopped during pregnancy | 5 (14.3) | | 1 (2.9) | |
| Total: Not Smoked | 34 (97.1) | | 32 (91.5) | |
| Smoking | 1 (2.9) | | 3 (8.6) | |
| Self-reported urinary incontinence n(%) | | | | |
| Never | 24 (68.6) | 10 (28.6) | 19 (54.2) | 10 (28.6) |
| <1/week | 3 (8.6) | 5 (14.3) | 8 (22.9) | 9 (25.7) |
| >1/week | 5 (14.3) | 2 (5.7) | 4 (11.4) | 5 (14.3) |
| Daily | 1 (2.9) | 3 (8.6) | 3 (8.6) | 1 (2.9) |
| Don’t know | 2 (5.6) | 2 (5.7) | 1 (2.9) | |
| NA | | 1 (2.9) | | 1 (2.9) |
| Missing | | 12 (34.2) | | 9 (25.6) |

Table 6.2. (continued)

*Gestation, Body Mass Index, Medical Conditions, Self-Reported Urinary Incontinence, Self-Reported General Exercise and Smoking Habits of Participants*

| | Control | | Intervention | |
|---|---|---|---|---|
| Characteristic | Baseline (n = 35) | Follow-up (n=22) | Baseline (n = 35) | Follow-up (n=25) |
| Self-reported general exercise/week n(%) | | | | |
| 30 minutes x 5 | 11 (31.4) | 3 (8.6) | 9 (25.7) | 5 (14.2) |
| 30 minutes x 1 – 4 | 14 (40.0) | 9 (25.7) | 11 (31.4) | 9 (25.7) |
| 10 – 20 minutes x 5 | 6 (17.2) | 6 (17.1) | 8 (22.9) | 3 (8.6) |
| 10 minutes x 1- 4 | 2 (5.7) | 3 (8.6) | 5 (14.3) | 7 (20.0) |
| Never | 2 (5.7) | 1 (2.9) | 2 (5.7) | |
| Other | | | | 1 (2.9) |
| NA | | 1 (2.9) | | 1 (2.9) |
| Missing | | 12 (34.1) | | 9 (25.7) |

[a]More than one answer.

[b]BMI was calculated as weight prior to becoming pregnant divided by height squared; height and weight were measured at antenatal clinics.

[c]Data are missing because respondents' heights were not measured.

## 6.40 Primary Outcome Measures

### 6.41 Awareness and sources of information about pelvic floor muscles.

Table 6.3 presents survey responses for the participants' awareness of PFM and PFME, including reporting how participants obtained the information on PFM. There were 5 (14.3%) participants at baseline in each group who had not heard of PFM. Seven of these 10 participants completed the trial which included three participants from the intervention group and four participants from the control group.

Table 6.3.

*Participants' Awareness and Sources of Information about Pelvic Floor Muscles*

| Item | Control (n = 35) | Intervention (n = 35) |
|---|---|---|
| Have you heard of PFM? n(%) | | |
| Yes | 30 (85.7) | 30 (85.7) |
| No | 3 (8.6) | 4 (11.4) |
| Don't know | 2 (5.7) | 1 (2.9) |
| Methods of hearing about pelvic floor muscles[a] n(%) | | |
| Physiotherapist | 5 (14.3) | 6 (17.1) |
| Midwife | 8 (22.9) | 12 (34.3) |
| Book | 5 (14.3) | 10 (28.6) |
| Internet | 10 (28.6) | 14 (40.0) |
| Other | 15 (42.9) | 13 (37.1) |
| Not applicable | 5 (14.3) | 5 (14.3) |
| Other methods of hearing about pelvic floor muscles[a] n(%) | | |
| Family/friend | 10 (28.6) | 6 (17.1) |
| GP | | 1 (2.9) |
| School/education | 2 (5.7) | 3 (8.6) |
| Gym/yoga/pilates | 4 (11.4) | 4 (11.4) |
| TV/Other | 4 (11.4) | 2 (5.7) |
| Have you exercised your PFM? n(%) | | |
| No | 10 (28.6) | 5 (14.3) |
| Yes | 18 (51.4) | 19 (54.3) |
| Doing PFME (Baseline) | 5 (14.3) | 4 (11.4) |
| Don't know | 2 (5.7) | 7 (20.0) |

[a]Able to choose more than one answer.

## 6.42 Participants' knowledge of pelvic floor muscles.

Table 6.4 and Figures 6.2 to 6.5 present the results for participants' knowledge of PFM at baseline, immediately post-education and at follow-up.

### *Knowledge of pelvic floor muscle function.*

There were significant differences in the intervention group between baseline and post-education, and baseline and follow-up; for knowledge that PFM prevent or reduce faecal incontinence with more participants knowing that PFM prevent faecal incontinence. There were significant differences in the intervention group between baseline and post-education, for knowledge that the PFM play a role in supporting the back with more participants knowing that PFM play a role in supporting the back although participants did not retain this knowledge at follow-up. There were significant differences in the intervention group between baseline and post-education for knowledge of the overall function of the PFM with more participants knowing the overall function of the PFM. Participants in the intervention group had increased knowledge about the overall functions of the PFM at follow-up compared to the control group (Figures 6.2 and 6.3).

### *Knowledge of pelvic floor muscle anatomy.*

Participants in the intervention group were significantly more knowledgeable about the anatomy of the PFM immediately post-education compared to baseline; and at follow-up compared to baseline about the PFM surrounding the bowel. Participants in the intervention group were significantly more knowledgeable about the anatomy of the PFM immediately post-education compared to baseline; and at follow-up compared to baseline about the PFM surrounding the bladder outlet, bowel and vagina. Participants in the intervention group had increased knowledge about the anatomy of the PFM after education.

Participants in the intervention group showed significant differences at baseline compared to post-education for knowledge that a small bladder does not cause UI in pregnant women. More women, after education, had increased knowledge that a small bladder does not cause UI. Participants in the intervention group showed significant differences at baseline and post-education; and baseline and follow-up for knowledge that pregnant women may experience UI due to PFM dysfunction. After education, more participants in the intervention group demonstrated increased knowledge of PFM dysfunction (Figure 6.4). Participants in the intervention group were significantly more knowledgeable about the function of transversus abdominis and PFM regarding co-contraction at follow-up compared to baseline. However, there was no significant improvement in knowledge levels about the function of transversus abdominis and PFM regarding co-contraction in the control group between baseline and follow-up.

Results from the Post-Education Questionnaire (Appendix H) for the participants in the intervention group are shown in Figure 6.5 (Appendix N, Table 10). The participants' knowledge for the reasons for doing PFME, "to strengthen and increase co-ordination of the PFM", was answered correctly by 23 (85.2%) of the 27 participants in the intervention group who watched the intervention.

There were significant differences between the intervention and control groups at follow-up regarding who responded "don't know" when asked if they understood the anatomy of the PFM with more participants in the intervention group reporting that they knew about the anatomy of the PFM at follow-up compared to the control group. There were significant differences between the intervention and control groups at follow-up regarding knowledge of the anatomy of the PFM surrounding the vagina; and surrounding the bowel; with more participants in the intervention group being knowledgeable about the anatomy of the PFM surrounding the vagina and the bowel compared to the participants in the control group.

There were significant differences between the intervention and control groups regarding overall knowledge of the anatomy of the PFM (surrounding bladder outlet, bowel and vagina) with more participants in the intervention group being knowledgeable about the overall anatomy of the PFM compared to participants in the control group. The knowledge of anatomy of the PFM surrounding the bowel, between the control and intervention groups, showed increased knowledge in the intervention group compared to the control group (Figure 6.6).

Table 6.4.

*Participants' Responses Regarding Knowledge of Pelvic Floor Muscles*

| | Baseline | | Follow-up | | | McNemar's test *p*-value | | | | Fisher's Exact *p*-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) | | Control (n = 35) | Intervention (n = 35) | | | |
| Knowledge item | | | Fwup | Psted | Fwup | Bsln/ Fwup | Bsln/ Psted | Psted/ Fwup | Bsln/ Fwup | |
| What do your PFM do?[a] n(%) | | | | | | | | | | |
| Don't know | 4 (11.4) | 9 (25.7) | 1 (2.9) | 1 (2.9) | 1 (2.9) | * | .070 | | .031 | 1.000 |
| A: Prevent UI[b] | 31 (88.6) | 26 (74.3) | 21 (60.0) | 26 (74.3) | 24 (68.6) | .500 | | | | 1.000 |
| B: Prevent faecal incontinence[b] | 17 (48.6) | 10 (28.6) | 12 (34.3) | 17 (48.6) | 19 (54.3) | 1.000 | .006 | .727 | <.001 | .139 |
| C: Support your back[b] | 3 (8.6) | 4 (11.4) | 4 (11.4) | 16 (45.7) | 6 (17.1) | * | .002 | .012 | .375 | .730 |
| A & B & C[c] | | 2 (5.8) | 3 (8.6) | 13 (37.4) | 6 (17.1) | .125 | .001 | .070 | .125 | .470 |
| Not Applicable[d] | | | 1 (2.9) | 1 (2.9) | 1 (2.9) | | | | | |
| Missing[d] | | | 12 (34.3) | 7 (20.0) | 9 (25.7) | | | | | |

Table 6.4. (continued)

*Participants' Responses Regarding Knowledge of Pelvic Floor Muscles*

| | Baseline | | Follow-up | | | McNemar's test *p*-value | | | | Fisher's Exact *p*-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) | | Control (n = 35) | Intervention (n = 35) | | | |
| Knowledge item | | | Fwup | Psted | Fwup | Bsln/ Fwup | Bsln/ Psted | Psted/ Fwup | Bsln/ Fwup | |
| What do your PFM go around? [a] n(%) | | | | | | | | | | |
| Don't know | 12 (34.3) | 10 (28.6) | 4 (11.4) | | | .687 | | | | .041 |
| A Bladder outlet[b] | 20 (57.1) | 22 (62.9) | 17 (48.6) | 22 (62.9) | 23 (65.7) | * | * | * | * | .228 |
| B Vagina[b] | 17 (48.6) | 22 (62.9) | 16 (45.7) | 25 (71.4) | 24 (68.6) | * | | | | .040 |
| C Bowel[b] | 4 (11.4) | 8 (22.9) | 4 (11.4) | 23 (65.7) | 15 (42.9) | * | <.001 | .016 | .004 | .007 |
| None of the answers is correct | 1 (2.9) | | | | | | | | | |
| A & B & C[c] | 3 (8.6) | 6 (17.1) | 4 (11.4) | 19 (54.3) | 1 3(37.2) | .625 | <.001 | .070 | .008 | .032 |

Table 6.4 (continued)

*Participants' Responses Regarding Knowledge of Pelvic Floor Muscles*

| | Baseline | | Follow-up | | | McNemar's test *p*-value | | | | Fisher's Exact |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) | | Control (n = 35) | Intervention (n = 35) | | | *p*-value |
| Knowledge item | | | Fwup | Psted | Fwup | Bsln/ Fwup | Bsln/ Psted | Psted/ Fwup | Bsln/ Fwup | |
| Why might women leak urine when they are pregnant? [a] n(%) | | | | | | | | | | |
| Don't know | 6 (17.1) | 5 (14.3) | 4 (11.4) | | 1 (2.9) | * | * | * | * | .171 |
| A: They are pregnant | 16 (45.7) | 15 (42.9) | 8 (22.9) | 6 (17.1) | 8 (22.9) | 1.000 | .146 | .375 | .581 | .768 |
| B: Bladder is too small | 9 (25.7) | 10 (28.6) | 6 (17.1) | 1 (2.9) | 6 (17.1) | | .016 | | 1.0 | |
| C: PFM not work properly[c] | 21 (60.0) | 23 (65.7) | 16 (45.7) | 27 (77.1) | 23 (65.7) | | | | | |
| None of the answers is correct | 2 (5.7) | 2 (5.7) | 1 (2.9) | | | | | | | |
| C only[c] | 11 (31.4) | 11 (31.4) | 9 (25.7) | 21 (60.0) | 16 (45.7) | 1.00 | <.001 | .125 | .012 | .148 |

Table 6.4. (continued)

*Participants' Responses Regarding Knowledge of Pelvic Floor Muscles*

| | Baseline | | Follow-up | | | McNemar's test *p*-value | | | | Fisher's Exact *p*-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) | | Control (n = 35) | Intervention (n = 35) | | | |
| Knowledge item | | | Fwup | Psted | Fwup | Bsln/ Fwup | Bsln/ Psted | Psted/ Fwup | Bsln/ Fwup | |
| Your PFM and lower tummy muscle should work together? | | | | | | | | | | |
| True[c] | 22 (62.9) | 14 (40.0) | 12 (34.3) | | 17 (48.6) | .754 | | | .004 | .382 |
| False | 2 (5.7) | 3 (8.6) | 2 (5.7) | | 5 (14.3) | | | | | |
| Sometimes | | 2 (5.7) | 3 (8.6) | | 1 (2.9) | | | | | |
| Don't know | 11 (31.4) | 16 (45.7) | 5 (14.3) | | 2 (5.9) | | | | | .378 |

Table 6.4. (continued)

*Participants' Responses Regarding Knowledge of Pelvic Floor Muscles*

| | Baseline | | Follow-up | | | McNemar's test *p*-value | | | | Fisher's Exact *p*-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) | | Control (n = 35) | Intervention (n = 35) | | | |
| Knowledge item | | | Fwup | Psted | Fwup | Bsln/ Fwup | Bsln/ Psted | Psted/ Fwup | Bsln/ Fwup | |
| How often should you exercise your PFM? | | | | | | | | | | |
| Daily[c] | 25 (71.4) | 26 (74.3) | 19 (54.3) | | 24 (68.6) | .219 | | | .063 | .328 |
| 2+/wk[b] | 3 (8.6) | 1 (2.9) | 1 (2.9) | | 1 (2.9) | | | | | |
| 1/wk | 1 (2.9) | | 2 (5.7) | | | | | | | |
| Never | 2 (5.7) | | | | | | | | | |
| Don't know | 4 (11.4) | 8 (22.9) | | | | | | | | |

*Note.* The number refers to the item in the Pre-Intervention Questionnaire (Appendix B); bsln = baseline; psted = post-education; fwup = follow-up. *Data demonstrates equality of results or statistical analysis is not applicable.

[a]Able to choose more than one answer.

[b]Answer partially correct.

[c]Answer correct.

[d]Same data applies for all item numbers at post-education and follow-up.

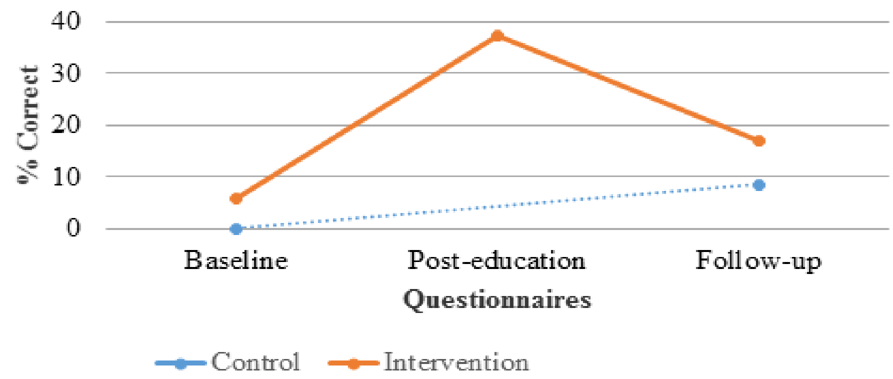



Figure 6.2. Levels of knowledge of function of pelvic floor muscles - percentage of correct answers compared between the control and intervention groups.

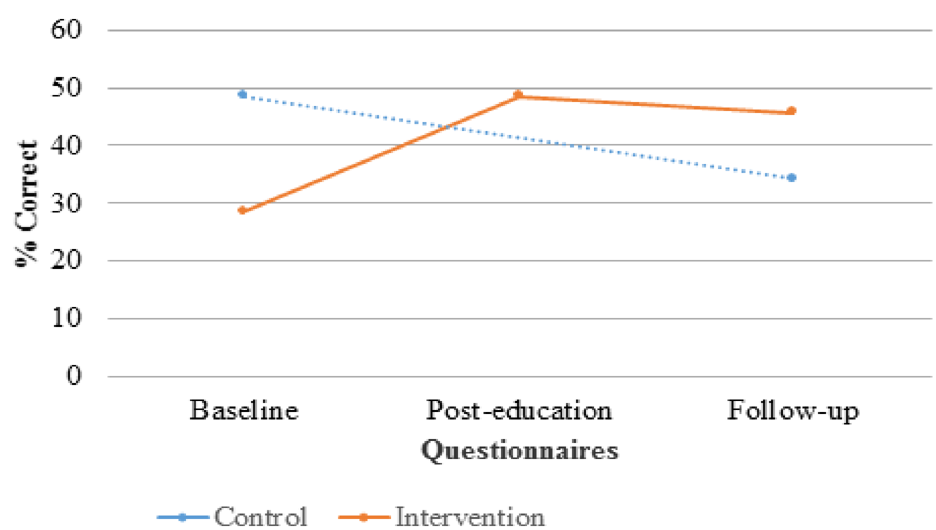



Figure 6.3. Levels of knowledge of function of pelvic floor muscles to prevent faecal incontinence - percentage of correct answers compared between the control and intervention groups.

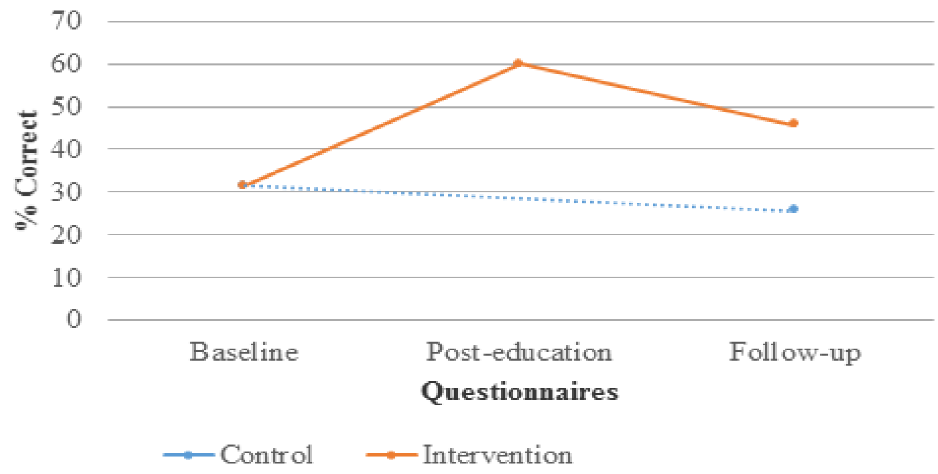



Figure 6.4. Levels of knowledge of UI due to pelvic floor muscle dysfunction - percentage of correct answers compared between the control and intervention groups.

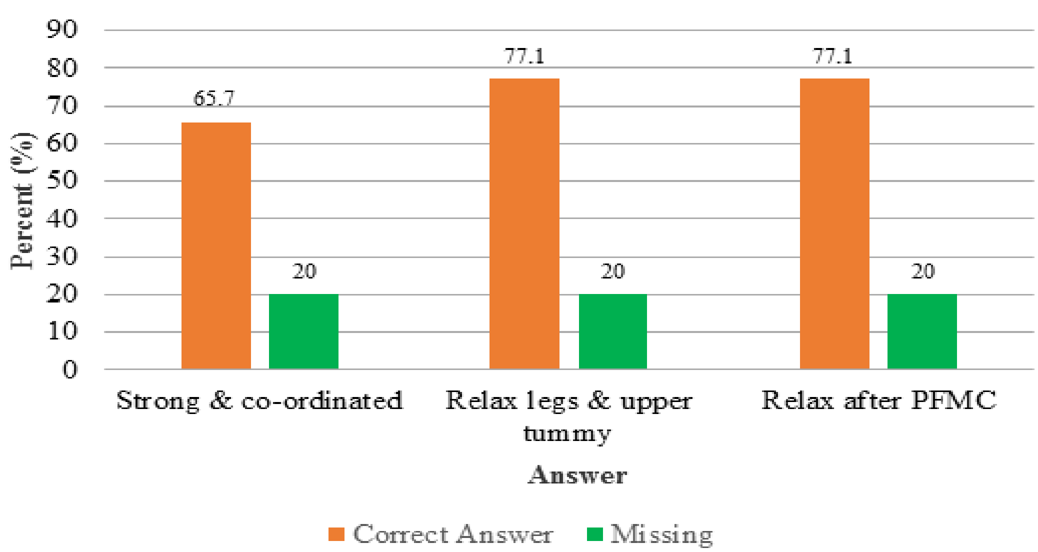



Figure 6.5. Levels of knowledge in the intervention group immediately after watching the web-based PFM video.

*Note.* PFMC = PFM contraction. One (2.9%) participant withdrew not shown in figure.

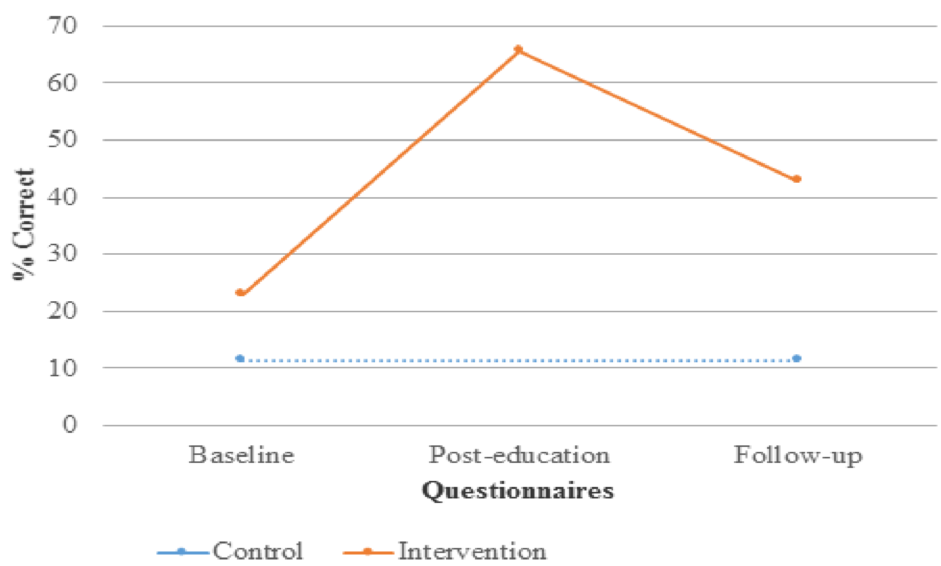



Figure 6.6. Levels of knowledge of anatomy of pelvic floor muscles around the bowel - percentage of correct answers compared between the control and intervention groups.

### 6.43 Confidence in and belief about engaging in a pelvic floor muscle exercise programme.

Table 6.5 presents participants' responses for confidence in and belief about PFM, PFME and UI. Participants in both the control and intervention groups demonstrated significant differences in groups at baseline and follow-up for their confidence in and belief about following a recommended PFME programme. At baseline, participants in both groups intended to follow a recommended PFME programme but at follow-up participants in both groups reported that they were unable to follow their planned regime.

Participants in both the control and intervention groups had significantly increased belief between baseline and follow-up that they would become better at doing PFME with practise. Participants in the intervention group had significantly increased confidence in and belief about (or knowledge) treatment or help being available for UI during pregnancy.

Participants in both the control and intervention groups had significantly increased belief between baseline and follow-up that their PFM would become stronger by practicing PFME. Participants in the control group believed that their PFM would become stronger with practise but the participants in the intervention group had increased belief that they were undecided as to whether their PFM would become stronger with practise. Participants in the intervention group had significantly increased belief between baseline and follow-up that they would be able to follow the PFME advice when they were busy compared to participants in the control group.

There were significant differences between the control and intervention groups at baseline with participants in the intervention group having increased belief that they would not leak urine during pregnancy compared to participants in the control group. Participants in the intervention group had significantly increased belief that they would be able to integrate PFME into daily life compared to the participants in the control group. At follow-up participants in the control group were shown to have significantly greater belief that they would be able to remind themselves to do PFME compared to the participants in the intervention group.

At follow-up, 13 (37.1%) participants in the intervention group felt they were able to continue to practise the "knack" compared to 4 (11.4%) participants in the control group prior to coughing and lifting. During the interview participants in the intervention group were shown to have increased belief by that they were able to practise the "knack" and that PFME helped to reduce or prevent UI. At follow-up in the intervention group 16 (45.7%) respondents reported that they believed PFME reduced or prevented UI compared to 8 (22.9%) respondents in the control group.

There were results between the participants in the control and intervention groups that were not statistically significant but indicated clinically important differences between the groups (Figures 6.7 and 6.8). Participants in the intervention group were more likely to believe that developing UI during pregnancy was not a normal occurrence at follow-up (42.9%) compared to baseline (31.4%) but there were no changes in participants' beliefs about developing UI during pregnancy in the control group between baseline and follow-up. At follow-up in the intervention group there were strong increases in participants' beliefs that they were more confident practicing PFME whilst doing housework compared to participants in the control group.

Table 6.5.

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| Belief statement | SA | A | U | D | SD | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| | Control (n = 35) / Intervention (n = 35) | | | | | | |
| I think it is normal for women to leak urine (wee) when pregnant[a] n(%) | | | | | | .156/ .419 | |
| Baseline | 1 (2.9)/ 0 | 16 (45.7)/ 10 (28.6) | 11 (31.4)/ 14 (40.0) | 6 (17.1)/ 9 (25.7) | 1 (2.9)/ 2 (5.7) | | .081 |
| Follow-up | 9 (25.7)/ 7 (20.0) | 0/ 0 | 4 (11.4)/ 3 (8.6) | 6 (17.1)/ 10 (28.6) | 3 (8.6)/ 5 (14.3) | | .246 |
| I believe I will start to leak urine (wee) whilst pregnant or my leakage will get worse[a] n(%) | | | | | | | |
| Baseline | 4 (11.4)/ 0 | 11 (31.4)/ 4 (11.4) | 10 (28.6)/ 18 (51.4) | 9 (25.7)/ 12 (34.3) | 1(2.9)/ 1(2.9) | | .031 |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| | Control (n = 35) / Intervention (n = 35) | | | | | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| Belief statement | SA | A | U | D | SD | | |
| I think there is treatment or help for women who leak urine (wee) when pregnant n(%) | | | | | | .054/ .033 | |
| Baseline | 11 (31.4)/ 8 (22.8) | 19 (54.3)/ 17 (48.6) | 5 (14.3)/ 10 (28.6) | 0/ 0 | 0/ 0 | | .177 |
| Follow-up | 5 (14.3)/ 10 (28.6) | 13 (37.1)/ 14 (40.0) | 2 (5.7)/ 1 (2.9) | 0/ 0 | 2 (5.7)/ 0 | | .091 |
| If I receive information on my PFM I intend to follow the advice given n(%) | | | | | | .010/ < .001 | |
| Baseline | 15 (42.9)/ 17 (48.6) | 19 (54.2)/ 16 (45.7) | 1 (2.9)/ 2 (5.7) | 0/ 0 | 0/ 0 | | .750 |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| Belief statement | SA | A | U | D | SD | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| | Control (n = 35) / Intervention (n = 35) | | | | | | |
| I have managed to stick to my planned PFME regime n(%) | | | | | | | |
| Follow-up | 1 (2.9)/ | 5 (14.3)/ 9 (25.7) | 3 (8.6)/ 3 (8.6) | 2 (5.7)/ 12 (34.3) | 0/ 0 | | .109 |
| If I am advised to do PFME I will try to do them n(%) | | | | | | .414/ .782 | |
| Baseline | 17 (48.6)/ 18 (51.4)/ | 18 (51.4)/ 15 (42.9) | 0/ 2 (5.7) | 0/ 0 | 0/ 0 | | .995 |
| Follow-up - I think PFME are important n(%) | 14 (40.0)/ 16 (45.7) | 7 (20.0)/ 8 (22.9) | 1(2.9)/ 0 | 0/ 1(2.9) | 0/ 0 | | .980 |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| | Control (n = 35) / Intervention (n = 35) | | | | | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| Belief statement | SA | A | U | D | SD | | |
| If I follow the advice to do the PFME I will become better at them n(%) | | | | | | .020/ 0.001 | |
| Baseline | 18 (51.4)/ 15 (42.9) | 17 (48.6)/ 17 (48.6) | 0/ 2 (5.6) | 0/ 0 | 0/ 1 (2.9) | | .300 |
| Follow-up | 2 (5.7)/ 2 (5.7) | 7 (20.0)/ 14 (40.0) | 1 (2.9)/ 5 (14.3) | 0/ 1 (2.9) | 1 (2.9)/ 0 | | .490 |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| Belief statement | SA | A | U | D | SD | Wilcoxon $p$-value | Mann Whitney $p$-value |
|---|---|---|---|---|---|---|---|
| | Control (n = 35) / Intervention (n = 35) | | | | | | |
| If I follow the advice to do the PFME I will become stronger n(%) | | | | | | .025/ < .001 | |
| Baseline | 18 (51.4)/ 20 (57.1) | 16 (45.7)/ 11 (31.4) | 1 (2.9)/ 3 (8.6) | 0/ 0 | 0/ 1 (2.9) | | .915 |
| Follow-up | 3 (8.6)/ 5 (14.3) | 6 (17.1)/ 11 (31.4) | 2 (5.7)/ 7 (20.0) | 0/ 0 | 0/ 0 | | .496 |
| My friends have informed me that I should do PFME n(%) | | | | | | | |
| Baseline | 9 (25.7)/ 7 (20.0) | 12 (34.3)/ 13 (37.1) | 8 (22.9)/ 7 (20.0) | 6 (17.1)/ 8 (22.9) | 0/ 0 | | .583 |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| | Control (n = 35) / Intervention (n = 35) | | | | | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| Belief statement | SA | A | U | D | SD | | |
| I will be able to follow the PFME advice when I am busy n(%) | | | | | | .157/ .021 | |
| Baseline | 6 (17.1)/ 8 (22.9) | 25 (71.4)/ 13 (37.1) | 3 (8.6)/ 11 (31.4) | 1 (2.9)/ 3 (8.6) | 0/ 0 | | .144 |
| Follow-up | 3 (8.6)/ 0 | 5 (14.3)/ 14 (40.0) | 3 (8.6)/ 4 (11.4) | 0/ 6 (17.1) | 0/ 0 | | .056 |
| Able to integrate PFME into daily life n(%) | | | | | | | .036 |
| Follow-up | 2(5.7)/ 1(2.9) | 8(22.9)/ 17(48.6) | 0/ 4(11.4) | 0/ 2(5.7) | 0/ 0 | | |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| | Control (n = 35) / Intervention (n = 35) | | | | | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| Belief statement | SA | A | U | D | SD | | |
| Confident doing PFME with exercise and housework n(%) | | | | | | | .090 |
| Follow-up | 1 (2.9)/ 0 | 7 (20.0)/ 14 (40) | 2 (5.7)/ 4 (11.4) | 0/ 6 (17.1) | 0/ 0 | | |
| Able to do PFME prior to coughing or lifting ("knack") n(%) | | | | | | | .334 |
| Follow-up | 0/ 0 | 4 (11.4)/ 13 (37.1) | 3 (8.6)/ 7 (20.0) | 2 (5.7)/ 4 (11.4) | 1 (2.9)/ 0 | | |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| | Control (n = 35) / Intervention (n = 35) | | | | | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| Belief statement | SA | A | U | D | SD | | |
| Reminding myself to do the exercises will be easy n(%) | | | | | | .257/ .075 | |
| Baseline | 5 (14.3)/ 2 (5.7) | 22 (62.9)/ 15 (42.9)/ | 4 (11.4)/ 11 (31.4) | 4 (11.4)/ 7 (20.0) | 0/ 0 | | .190 |
| Follow-up | 2 (5.7)/ 0 | 7 (20.0)/ 10 (28.6) | 0/ 2 (5.7) | 2 (5.7)/ 11 (31.4) | 0/ 1 (2.9)/ | | .016 |
| I believe that PFME will prevent or reduce leakage of urine (wee) n(%) | | | | | | .083/ .763 | |
| Baseline | 15 (42.9)/ 10 (28.6) | 16 (45.7)/ 20 (57.1) | 4 (11.4)/ 5 (14.3) | 0/ 0 | 0/ 0 | | .255 |
| Follow-up | 3 (8.6)/ 7 (20.0) | 5 (14.3)/ 15 (42.9) | 2 (5.7)/ 2 (5.7) | 1 (2.9)/ 0 | 0/ 0 | | .490 |

Table 6.5. (continued)

*Participants' Responses Regarding Confidence in and Belief about Engaging in Pelvic Floor Muscle Exercises*

| Belief statement | SA | A | U | D | SD | Wilcoxon *p*-value | Mann Whitney *p*-value |
|---|---|---|---|---|---|---|---|
| | Control (n = 35) / Intervention (n = 35) | | | | | | |
| Having learnt these exercises I felt I was able to stop/reduce UI n(%) | | | | | | | |
| Follow-up | 3 (8.6)/ 2 (5.7) | 5 (14.3)/ 14 (40.0) | 2 (5.7)/ 8 (22.9) | 1 (2.9)/ 0 | 0/ 0 | | .431 |

*Note.* SA = strongly agree; A = agree; U = undecided; D = disagree; SD = strongly disagree. Percentages do not equal 100 because missing and not applicable data have not been included to make the table less cumbersome. At follow-up survey was completed by participants who practised PFME. Zero (0) has been inserted to indicate that the data are not missing.

[a]SA and A demonstrate less belief.

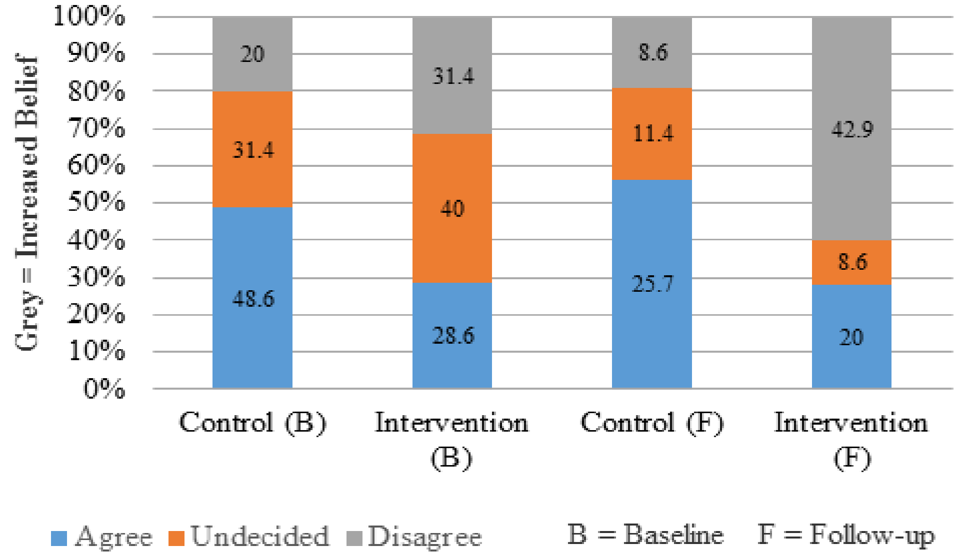



Figure 6.7. Participants', in the intervention group, levels of belief about the normality of the development of UI during pregnancy compared to the participants in the control group.

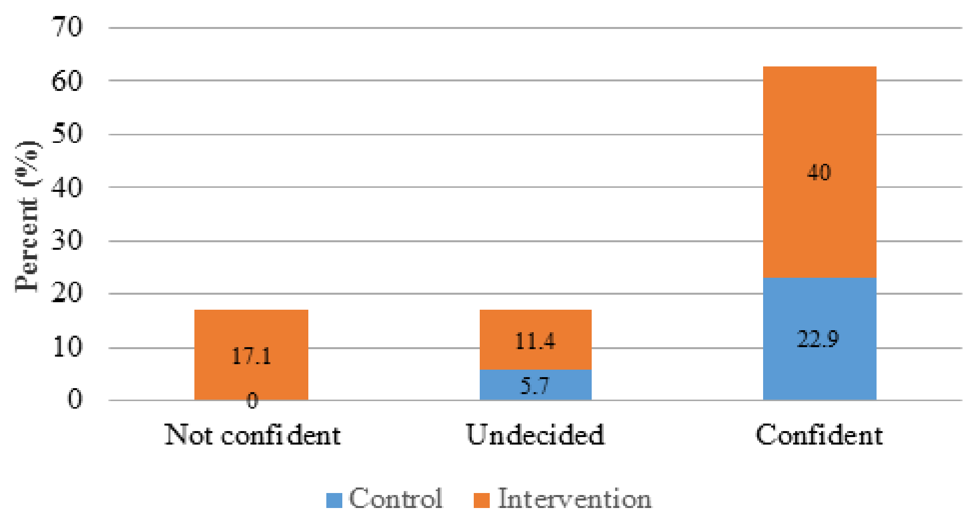



Figure 6.8. Participants', in the intervention group, levels of confidence in being able to do PFME while doing housework compared to the participants in the control group.

### 6.44 Adherence to a pelvic floor muscle exercise programme.

Responses from the Final Post-Intervention Questionnaire showed there were significant differences in adherence between the control and intervention groups at follow-up [24 (68.6%) in the intervention group and 10 (28.6%) in the control group (Mann Whitney *p*-value .048)] with participants in the intervention group having increased adherence to a PFME programme compared to participants in the control group.

There were 5 (14.3%) participants at baseline in each group who had not heard of PFM. Seven of these 10 participants who had not heard of PFM completed the trial which included three participants from the intervention group and four participants from the control group. At follow-up three of the four participants in the intervention group were engaging in PFME whilst none of the three participants in the control group reported engagement in PFME.

Of the 47 participants who completed the study 34 (72.3%) returned the diary [22 (62.9%) in the intervention group and 12 (34.4%) in the control group]. One (2.9%) participant in each group reported that they were unable to open the diary and three (8.5%) participants in the control group reported posting the dairy but the researcher did not receive it.

Levels of adherence to a PFME programme and episodes of UI as shown in Table 6.6 were measured using the participants' diaries between 22 to 35 weeks' gestation. In the control group the participants recorded in the diaries for a total of 998 days and 7 (58.3%) participants reported episodes of UI and in the intervention group participants recorded for a total of 2040 days and 14 (63.6%) participants reported episodes of UI.

Participants in the intervention group were significantly more likely to practise PFME on more days (with more repetitions per day) than participants in the control group, with participants in the intervention group being 19 times more likely to engage in multiple sets of 10 contractions per day than participants in the control group (Table 6.7). Participants in the intervention group were also significantly more likely to practise

PFME on more days (with more repetitions per day) as their gestation period increased compared to participants in the control group (Table 6.7).

Several factors that have been found to predict a PFME programme being undertaken, namely, frequency of UI (Alewijnse et al., 2001; Alewijnse, Metsemakers, et al., 2003); SEIFA, participants who speak LOTE , level of education and attendance at ANE (Whitford et al., 2007a); and women who smoke or are having a LUSCS (Bo et al., 2007). Increased episodes of UI are associated with increased BMI (Subak et al., 2009). Modelling using generalised estimating equations which contained the group variable and these predictor variables demonstrated that none of these predictors significantly affected the differences between the groups in practicing PFME. Adjusted analyses demonstrated that the intervention group were significantly more likely to adhere to PFME than the control group regardless of the above predicted factors (Appendix N, Table 11).

Participants in the intervention group were also more motivated to link doing PFME to an activity (functional PFME) compared to the participants in the control group who were significantly more likely to rely on their memory as a reminder for undertaking PFME (Table 6.8). In the intervention group 12 (48%) participants engaged in PFME because they were so advised, compared to 5 (22.7%) participants in the control group. In the control group, 11 (50%) participants would have liked to have had more information on PFME compared to 7 (28%) participants in the intervention group.

Table 6.6.

*Participant's Diary Responses Reporting Frequency of Completing Pelvic Floor Muscle Exercises and Episodes of Urinary Incontinence*

| | Number of days recorded (22 – 35 weeks' gestation) | | | | |
|---|---|---|---|---|---|
| | (n = 3038) | | | (n = 998) | ( n= 2040) |
| | | Baseline | | Follow-up | |
| | Both groups | Control | Intervention | Control | Intervention |
| Diary responses | (n = 34) | (n = 35) | (n = 35) | (n = 12) | (n = 22) |
| Episodes of UI n(%) | | | | | |
| Yes | 118 (3.9) | | | 77 (7.7)* | 41 (2.0) |
| No | 1541 (50.7) | | | 326 (32.7) | 1215 (59.6) |
| Missing | 1379 (45.4) | | | 595 (59.6) | 784 (38.4) |
| Practised PFME n(%) | | | | | |
| Yes | | | | 508 (50.9) | 1942 (95.2) |
| No | | | | 490 (49.1) | 98 (4.8) |

Table 6.6. (continued)

*Participant's Responses Reporting Frequency of Completing Pelvic Floor Muscle Exercises and Episodes of Urinary Incontinence*

| | Number of days recorded (22 – 35 weeks' gestation) | | | | |
|---|---|---|---|---|---|
| | (n = 3038) | | | (n = 998) | ( n= 2040) |
| | | Baseline | | Follow-up | |
| | Both groups | Control | Intervention | Control | Intervention |
| Diary responses | (n = 34) | (n = 35) | (n = 35) | (n = 12) | (n = 22) |
| PFME frequency/day n(%) | | | | | |
| Mean $\pm$(SD) | | | | 6.0 $\pm$(10.4) | 18.8 $\pm$(12.5) |
| Median | | | | 0.0 | 20.0 |
| 10 | | | | 75 (7.5) | 233 (11.5) |
| 20 | | | | 104 (10.4) | 427 (20.9) |
| 30 | | | | 105 (10.5) | 876 (42.9) |
| 40 | | | | 1 (0.1) | 19 (0.9) |
| 60 | | | | | 9 (0.5) |
| Days not practised | | | | 713 (71.4) | 476 (23.3) |

Table 6.6. (continued)

*Participant's Responses Reporting Frequency of Completing Pelvic Floor Muscle Exercises and Episodes of Urinary Incontinence*

| | Number of days recorded (22 – 35 weeks' gestation) | | | | |
|---|---|---|---|---|---|
| | (n = 3038) | | | (n = 998) | ( n= 2040) |
| | | Baseline | | Follow-up | |
| Survey responses | Both groups (n = 34) | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) |
| Engaged in PFME n(%) | | | | | |
| Yes | | 5 (14.3) | 4 (11.4) | 10 (28.5) | 24 (68.6) |
| No | | 30 (85.7) | 31 (88.6) | 12 (34.3) | 1 (2.9) |
| Not applicable | | | | 1 (2.9) | 1 (2.9) |
| Missing | | | | 12 (34.3) | 9 (25.6) |

*Note*. *One participant in the control group recorded UI for 70 days from 73 days of recording, between 25 to 35 weeks' gestation.

Table 6.7.

*Participants' Self-Reported Engagement in Pelvic Floor Muscle Exercises Compared Between the Intervention and the Control group*

| | Odds ratio* | *p*-value (n = 34) | 95% Wald confidence interval for odds ratio | |
|---|---|---|---|---|
| Model 1 | | | Lower | Upper |
| Control | 1 | | | |
| Intervention | 19.114 | 0.013 | 1.858 | 196.666 |
| Model 2 | | | | |
| Control | 1 | | | |
| Intervention | 19.792 | 0.013[a] | 1.878 | 208.574 |
| Weeks' gestation (22 – 35) | 1.051 | 0.023 | 1.007 | 1.096 |

*Note.* *Analysed using the General Linear Model.

[a]Comparison between the intervention and control group adjusting for gestation period.

Table 6.8.

*Participants' Survey Feedback Regarding Pelvic Floor Muscle Exercises*

| Final Post-Intervention Questionnaire | Follow-up<br>Control<br>(n = 22) | <br>Intervention<br>(n = 25) | Fisher's Exact *p*-value |
|---|---|---|---|
| Used as a reminder to do PFME[a] | | | |
| Activity, such as walking, at work | 5 (22.7) | 12 (48.0) | .058 |
| Stickers | | 2 (8.0) | * |
| Memory | 6 (27.3) | 8 (32.0) | .017 |
| Motivated | 3 (13.6) | 7 (28.0) | .705 |
| Urinary incontinence | 4 (18.2) | 5 (20.0) | |
| Undecided | | 3 (12.0) | |
| Motivated me to do PFME[a] | | | |
| Stickers | | 1 (4.0) | |
| Advised | 5 (22.7) | 12 (48.0) | .324 |
| Like doing general exercise | 2 (9.1) | 7 (28.0) | .295 |
| Urinary incontinence | 6 (27.3) | 11 (44.0) | .626 |
| Other | 1 (4.5) | 2 (8.0) | |
| Undecided | | 3 (12.0) | |

Table 6.8. (continued)

*Participants' Survey Feedback Regarding Pelvic Floor Muscle Exercises*

| | Follow-up | | Fisher's Exact *p*-value |
|---|---|---|---|
| Final Post-Intervention Questionnaire | Control (n = 22) | Intervention (n = 25) | |
| Sought information on PFM/E[a] | | | |
| Physiotherapist | 2 (9.1) | 5 (20.0) | * |
| Midwife | 5 (22.7) | 6 (24.0) | * |
| Book | 2 (9.1) | 2 (8.0) | * |
| Internet | 10 (45.0) | 15 (60.0) | * |
| Not look for information | 7 (31.8) | 8 (32.0) | * |
| Other | | 1 (4.0) | * |
| Like more information on PFM/E | | | |
| Yes | 11 (50.0) | 7 (28.0) | * |
| No | 7 (31.8) | 13 (52.0) | * |
| Undecided | 4 (18.2) | 5 (20.0) | |

*Note.* *Data demonstrates equality of results or statistical analysis is not applicable.

[a]Able to choose more than one answer.

### 6.45 Interview responses to the web-based pelvic floor muscle education.

Table 6.9 presents the responses for the semi-structured interviews (Appendix I) by telephone and examples of participants' quotes. The data were categorised into six themes which were based on the conceptual framework identified earlier by the researcher (Section 6.27.2). The themes were:

1. Feedback on the web-based PFM education: The 24 (100%) participants interviewed reported that the web-based video was useful and /or helpful. Comments were that it was excellent, well explained or easy to understand. Two, of the seven participants who reported they spoke LOTE at home, had not heard of PFM or PFME prior to being involved in the research and they reported the web-based PFM education was valuable.

2. The "knack": Prior to watching the video only two participants had heard of the "knack" or pre-contraction prior to coughing, sneezing and lifting. Eighteen participants reported they were now practicing the "knack".

3. Prompts for practicing PFME: Fifteen (62.5%) participants reported that the web-based PFM education and taking part in the research had acted as a reminder to doing PFME. Strategies to remind the participants to do PFME included work, sitting, driving, taking a shower and a good memory. Three participants relied on a family member to act as a prompt for practicing PFME.

4. "Tips" sheet: There was information in the initial email (Appendix D) and more information at the end of the video advising participants to read, print or save the "tips" sheet PDF. Four (16.7%) of the participants reported that they had not noticed the "tips" sheet PDF as an email attachment. Once the researcher had alerted them to the presence of the "tips" sheet, they reported that they would read it. Nine (37.5%) participants had printed the sheet and displayed it in a prominent place so that they could re-read for revision of the correct technique to facilitate PFME and as a reminder to do PFME. The "tips" sheet had been read, but not printed, by 11 (45.8%) participants.

5. Partners: Only one (4.2%) partner watched the web-based video the remaining 23 (95.8%) of participants reported that their partners had not watched the video. One participant reported that her partner had attended a PFM education session at an ANE class and thus he felt that he did not need to watch the video.

6. Extra information: Two participants had specific questions relating to PFM and PFME. Both questions related to overactive PFM as the participants were aware of friends having health issues due to overactivity of PFM. The remaining participants did not have any questions.

Table 6.9.

*Themes and Sub-Themes Identified from the Semi-Structured Interviews*

| | Themes | Participants' quotes | Responses (n = 24) |
|---|---|---|---|
| | Sub-themes | | |
| 1 | Feedback on the web-based PFM education n(%) | | |
| 1.1 | Useful/helpful | "it was really useful" "video was excellent and very helpful" | 24 (100.0) |
| 1.2 | Well explained/easy to understand. | "best example of PFME" "explained PFME better than they have ever been explained before" | 8 (33.3) |
| 2 | The "knack" n(%) | | |
| 2.1 | Not heard of the "knack" | "forwarded the video to family and friends as they did not know about PFM especially the "knack" | 22 (91.7) |
| 2.2 | Found the information on the "knack" helpful | "practises the "knack" while walking" | 24 (100.0) |
| 2.3 | Practicing the "knack" | | 18 (75.0) |

Table 6.9. (continued)

*Themes and Sub-Themes Identified from the Semi-Structured Interviews*

| | Themes | Participants' quotes | Responses (n = 24) |
|---|---|---|---|
| | Sub-themes | | |
| 3.0 | Practicing PFME n(%) | | |
| 3.1 | Yes | "partner keeps asking if she is doing PFME" "once I started doing PFME they become a habit and I will continue doing them" | 24 (100.0) |
| 3.2 | Prompts for practicing PFME n(%) | | |
| | Research | "research has helped me with commitment to PFME" | 15 (62.5) |
| | Family member | | 3 (12.5) |
| | Work/sitting/driving/shower | | 12 (50.0) |
| 4.0 | "Tips" sheet n(%) | | |
| 4.1 | Read | | 11 (45.8) |
| 4.2 | Printed and read | "keeps in the bedroom" "tips sheet on the fridge" | 9 (37.5) |
| 4.3 | Not notice "tips" as attachment in email | "did not see tips sheet but will look at it if I re-email it" | 4 (16.7) |

Table 6.9. (continued)

*Themes and Sub-Themes Identified from the Semi-Structured Interviews*

| | Themes | Participants' quotes | Responses (n = 24) |
|---|---|---|---|
| | Sub-themes | | |
| 5 | Partners n(%) | | |
| 5.1 | Watched web-based PFM video | "partner not like bodily functions so he will not watch the video" | 1 (4.2) |
| 6.0 | Questions n(%) | | |
| 6.1 | Requested extra information | | 2 (8.3) |

Table 6.9. (continued)

*Themes and Sub-Themes Identified from the Semi-Structured Interviews*

| | Themes | | Participants' quotes | Responses (n = 24) |
|---|---|---|---|---|
| | | Sub-themes | | |
| 7.0 | Comments n(%) | | | |
| 7.1 | | Feels doing correctly now | "had a good idea of PFME from Pilates but was unsure if I was doing them correctly – feel I am now as I was previously unsure" " doing PFME correctly with relaxed upper tummy muscles, using TA and making sure breathing correctly" | 8 (33.3) |
| 7.2 | | Hand placement/relax tummy/breath/ sitting | "found hand placement and doing PFME in sitting really educational" | 6 (25.0) |
| 7.3 | | Focus on PFM using anatomical areas | "feeling the movement at the front, middle and back passages helps me to focus on my PFME" | 2 (8.3) |

Table 6.9. (continued)

*Themes and Sub-Themes Identified from the Semi-Structured Interviews*

| Themes | | Participants' quotes | Responses (n = 24) |
|---|---|---|---|
| | Sub-themes | | |
| | | "Forgets to do PFME all the time but thinks more about doing PFME since being a participant in the trial" "Video very helpful. I have also looked up PFM on line. I speak LOTE but the video was easy to understand. I didn't know about contracting my PFM before coughing and lifting but am now trying to remember to do that" "helpful for UI" "motivated me to do PFM" "read more information on Internet" | |
| 7.4 | Additional comments | "family and friends watched video" | 10 (41.7) |

### 6.50 Antenatal education and usage of the Internet for pregnancy-related topics.

Table 6.10 presents the planned actions of participants with regards to attending ANE. There were 17 (48.4%) participants in the control group and 23 (65.7%) participants in the intervention group who attended ANE and of the participants who attended ANE 5 (29.4%) in the control group and 10 (43.5%) in the intervention group reported receiving education on PFM or PFME. Responses for other topics searched on the Internet by participants in the control (n = 10) and intervention (n = 4) groups respectively were stages of pregnancy [6 (60%)]; [2 (50%)]; health related to baby [2 (20%)]; [1 (25%)]; and health related to the pregnant woman [4 (40%)]; [2 (50%)].

Table 6.11 presents the feedback regarding the education programme from the participants in the intervention group with 22 (88%) of the 25 participants who responded to the questionnaire responding that they would recommend the web-based PFM education to a friend.

Table 6.10.

*Participants' Attendance at Antenatal Education and Usage of Internet for Pregnancy-Related Topics*

| | Baseline | | Follow-up | |
|---|---|---|---|---|
| ANE | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) |
| Attendance at ANE n(%) | | | | |
| Not planned/or had attended at follow-up | 2 (5.7) | 6 (17.1) | 5 (14.3) | 2 (5.7) |
| Planned to attend | 30 (85.7) | 27 (77.1) | | |
| Don't know | 2 (5.7) | | | |
| Not available | | 1 (2.9) | | |
| Attended this pregnancy | 1 (2.9) | 1 (2.9) | 17 (48.5) | 23 (65.7) |
| Not applicable | | | 1 (2.9) | 1 (2.9) |
| Missing | | | 12 (34.3) | 9 (25.7) |
| Education on PFM/E at ANE n(%) | | | (n = 17) | (n = 23) |
| Yes | | | 5 (29.4) | 10 (43.5) |
| No | | | 8 (47.1) | 10 (43.5) |
| Don't know | | | 1 (5.9) | 2 (8.7) |
| Missing | | | 3 (17.6) | 1 (4.3) |

Table 6.10. (continued)

*Participants' Attendance at Antenatal Education and Usage of Internet for Pregnancy-Related Topics*

| | Baseline | | Follow-up | |
|---|---|---|---|---|
| ANE | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) |
| Willing to attend ANE via the Internet n(%) | | | | |
| Yes | 26 (74.3) | 21 (60.0) | * | * |
| No | 5 (14.3) | 4 (11.4) | * | * |
| Don't know | 4 (11.4) | 10 (28.6) | * | * |
| Topics searched on Internet during pregnancy[a] n(%) | | | | |
| Pelvic floor muscles | 7 (20.0) | 9 (25.7) | * | * |
| Safe exercises | 19 (54.3) | 27 (77.1) | * | * |
| Back pain | 10 (28.6) | 19 (54.3) | * | * |
| Bladder | 2 (5.7) | 3 (8.6) | * | * |
| Bowel | 8 (22.9) | 12 (34.3) | * | * |
| Care of baby | 20 (57.1) | 24 (68.6) | * | * |
| Labour | 21 (60.0) | 23 (65.7) | * | * |
| Other | 10 (28.6) | 4 (11.4) | * | * |
| Not search Internet | 1 (2.9) | 1 (2.9) | * | * |

Table 6.10. (continued)

*Participants' Attendance at Antenatal Education and Usage of Internet for Pregnancy-Related Topics*

| | Baseline | | Follow-up | |
|---|---|---|---|---|
| ANE | Control (n = 35) | Intervention (n = 35) | Control (n = 35) | Intervention (n = 35) |
| Downloaded pregnancy-related Apps n(%) | | | | |
| No | | | 6 (27.3) | 8 (32.0) |
| Yes | | | 16 (72.7) | 17 (68.0) |
| Like recommendation to evidence-based pregnancy-related websites n(%) | | | | |
| SA | | | 9 (40.9) | 12 (48.0) |
| A | | | 12 (54.6) | 12 (48.0) |
| U | | | | 1 (4.0) |
| SD | | | 1 (4.5) | |

*Note.* SA = strongly agree; A = agree; U = undecided; D = disagree; SD = strongly disagree. *Data only collected at baseline. D = no responses.

[a]Able to choose more than one answer.

Table 6.11.

*Participants' Survey Responses Regarding the Web-Based Pelvic Floor Muscle Education Intervention*

| Final Post-Intervention Questionnaire | Intervention (n = 25) |
|---|---|
| Number of times watched intervention n(%) | |
| Once | 11 (44.0) |
| Twice | 9 (36.0) |
| Thrice | 5 (20.0) |
| Would recommend web-based PFM education video to a friend n(%) | |
| SA | 8 (32.0) |
| A | 14 (56.0) |
| U | 2 (8.0) |
| D | 1 (4.0) |
| May watch web-based PFM education video in future if[a] n(%) | |
| Pregnant | 13 (52.0) |
| Refresher for PFME | 15 (60.0) |
| Have urinary incontinence | 8 (32.0) |
| Don't know | 2 (8.0) |
| Other | 1 (4.0) |
| Improvements to web-based PFM education video n(%) | |
| Just right | 19 (76.0) |
| More detail | 4 (16.0) |
| Less detail | 1 (4.0) |
| Other | 1 (4.0) |

Table 6.11. (continued)

*Participants' Survey Responses Regarding the Web-Based Pelvic Floor Muscle Education Intervention*

| Final Post-Intervention Questionnaire | Intervention (n = 25) |
|---|---|
| Benefits of web-based PFM education video[a] n(%) | |
| Learnt how to do PFME | 19 (76.0) |
| Learnt when to do PFME ("knack") | 13 (52.0) |
| Convenient | 8 (32.0) |
| Easy to understand | 15 (60.0) |
| Felt not missing out on education | 8 (32.0) |
| Saved travel time to a class | 4 (16.0) |
| Other | 1 (4.0) |
| Would have done PFME if web-based PFM education unavailable n(%) | |
| Yes | 14 (56.0) |
| No | 5 (20.0) |
| Don't know | 6 (24.0) |

*Note*. SA = strongly agree; A = agree; U = undecided; D = disagree; SD = strongly disagree (no responses).

### 6.51 Consultation with a physiotherapist during pregnancy.

Table 6.12 presents responses regarding participants who consulted a PT during their pregnancy. There were 9 (12.9%) participants who consulted a PT during pregnancy, 4 (11.4%) in the control group and 5 (14.3%) in the intervention group. At follow-up, six of the nine participants who consulted a PT practised PFME during their pregnancy. One of these participants was in the control group, while five participants were in the intervention group. Appendix N (Table 12) presents responses for attendance at ANE and consultation with PT by participants who completed the research.

Table 6.12.

*Participants who Consulted a Physiotherapist During Pregnancy*

| | Baseline | | Follow-up | |
|---|---|---|---|---|
| | Control | Intervention | Control | Intervention |
| Seen by a physiotherapist n(%) | (n = 35) | (n = 35) | (n = 35) | (n = 35) |
| Yes | 4 (11.4) | 4 (11.4) | 4 (11.4) | 5 (14.3) |
| No | 31 (88.6) | 30 (85.7) | 18 (51.4) | 20 (57.1) |
| Don't know | | 1 (2.9) | | |
| Missing | | | 12 (34.3) | 9 (25.7) |
| Not applicable | | | 1 (2.9) | 1 (2.9) |
| Reason the physiotherapist was consulted n(%) | | | | |
| Back pain | 3 (8.6) | 3 (8.6) | 2 (5.7) | 5 (14.3) |
| UI | 1 (2.8) | | | |
| Other[a] | | 1 (2.8) | 2 (5.7) | |
| Not applicable | 31 (88.6) | 31 (88.6) | 19 (54.3) | 21 (60.0) |
| Missing | | | 12 (34.3) | 9 (25.7) |

[a]Included pain in shoulders, ribs and wrist.

### 6.60 Discussion

This randomised trial is the first to the author's knowledge to evaluate the effect of delivering a web-based PFM education programme for primipare women designed by a PT specialised in Women's Health. The design of the web-based PFM education intervention was based on the concepts of preventative health theory and constructed using the HBM education framework, (Hayden, 2009; Janz & Becker, 1984; Rosenstock, 1974a). The education was designed to raise awareness, confidence in and belief about engaging in a PFME programme and encourage adherence to a PFME programme. Results demonstrated that there were significant increases in the intervention group's awareness and knowledge of PFM; confidence in and belief about engaging in PFME; and increased adherence to a PFME programme but due to the amount of missing data caution needs to be used in the interpretation of the results. This PFME programme is the first in Australia to the author's knowledge to provide women with PFME training from a PT using a web-based format.

Participants in the intervention group showed significant increases in most aspects of knowledge on the function and anatomy of the PFM after receiving the education compared to the participants in the control group. Previous studies (Alewijnse et al., 2007; Morkved, 2007) have shown that women need a multi-faceted approach to education if they are going to do PFME. Recommendations are that an explanation be provided regarding a correct PFM contraction and then the woman should be encouraged to practise the technique and that a home PFME programme be provided to assist learning. A study on web-based diabetes education (Kandula et al., 2009) demonstrated increased knowledge on diabetes but to the author's knowledge there are limited studies that have measured levels of knowledge on PFM function and anatomy after either face-to-face or web-based education.

There were short-term increases in knowledge. Participants in the intervention group demonstrated almost 100% for levels of knowledge on the correct method of undertaking a PFM contraction immediately after viewing the web-based intervention. Participants in the intervention group were able to answer questions correctly immediately after viewing the intervention whilst approximately 10 weeks later the levels of knowledge for some participants had decreased. Perhaps during this window of time of increased knowledge women may be motivated to seek help for UI or PFM therapy if required and this knowledge gain would be further reinforced during consultation with the relevant health worker. Alternatively women could be encouraged to re-engage in the education at a later stage in pregnancy to refresh their knowledge levels. The feedback from the participants who took part in the semi-structured interviews were positive. As this study had not been undertaken previously there is no research with which to directly compare the results.

The participants in the intervention group also had significant increases in confidence in and belief about engaging in PFME and increased belief about developing UI during pregnancy is not a normal occurrence compared to the participants in the control group. This is important because as conceptualised by the HBM women need this confidence in, belief about and awareness of UI (the health consequence) if they are to engage in a preventative health behaviour (PFME) (Bandura, 1977; Dweck, 2012; Hayden, 2009; Rosenstock, 1974a). The HBM states that participants' conceptualise the benefits and barriers to undertaking a PFME which are affected by modifying their cues to action and self-efficacy and thus changes participants' behaviour and they are motivated to start a PFME programme.

There was a significant increase in adherence to a PFME programme by participants in the intervention group compared to the participants in the control group. Studies have confirmed that adherence to a PFME programme is important in preventing or improving UI (Alewijnse et al., 2007; Chiarelli & Cockburn, 1999; Gillard & Shamley, 2010; Reilly et al., 2002). Other studies have found low levels of engagement in a PFME programme whereas in our study a significant number of women undertook the PFME programme (Fabian et al., 2004, 2005). This is important because according to the HBM perceived susceptibility to a disease, such as UI in this study, addressing of barriers such as limited access to ANE, and motivating factors for cues to action are necessary if women are to engage in and adhere to a preventative health behaviour (Bandura, 1977; Dweck, 2012; Hayden, 2009; Rosenstock, 1974a) and perform PFME. In the present study, the number of participants with self-reported UI was higher in the intervention group compared to the participants in the control group at baseline and at follow-up, while responses to using UI as a reminder for practicing PFME were similar for both groups. Although the number of participants in the present study was small, UI was not linked to adherence to a PFME programme as documented in a previous study (Alewijnse, Mesters, et al., 2003), where frequency of UI was a reminder and motivator to practise PFME.

Participants in the intervention group recorded in their diary for twice as many days as participants in the control group. Although the trial was not powered to detect an effect on UI nearly 60% of participants in the intervention group reported no episodes of UI in their diaries. This is consistent with previous studies (Abrams et al., 2010; Boyle et al., 2012; Hay-Smith, 2013; National Collaborating Centre for Women's and Children's Health [UK], 2006) which demonstrate that PFME will reduce UI although further large studies would be required to see if this particular mode of delivery is effective in reducing UI.

Participants in the intervention group demonstrated a significant increase in the belief that they would be able to undertake a functional PFME programme, such as when they were busy and doing housework, and were therefore able to integrate the PFME into daily life much more successfully than the control group. The web-based PFM education aimed to encourage the participants to implement some cues to action (functional PFME and "knack"), for example doing PFME whilst walking or talking on the phone. Responses from the interviews and the questionnaires of the strategies used to remind women to do PFME showed that women were integrating PFME into their daily routine and linking PFME to an activity such as sitting or a work-related task. There were more frequent responses from participants in the intervention group who reported using strategies such as an activity, stickers or the "tips" sheet as reminders to do PFME than the control group. The implementation of the cues to action or engagement in functional PFME most likely led to the significant increase in adherence to a PFME programme by participants in the intervention group compared to the participants in the control group. A functional PFME programme is recommended (Bo, 2007b) and is a strategy designed to encourage adherence to a PFME programme. Additionally, during the qualitative feedback from the women, indications were that they were routinely practicing the “knack”. The “knack” is recommended to be taught and practised by pregnant women and women with SUI (Miller et al., 1998) therefore web-based ANE could be a successful means of facilitating this behaviour.

Participants who watched the web-based PFM programme had significantly increased self-perceived risk of PFM dysfunction during pregnancy after the education. The education addressed the misconceptions, such as PFM dysfunction is normal during pregnancy, in a manner that enhanced participants’ comprehensions and beliefs in the beneficial effect and achievability of behaviours to maintain or improve PFM function and facilitation. Previous studies using the HBM confirm that an increased self-perceived susceptibility predicts change in future planned behaviour (Palmer, 2004; Rhodes et al., 1997). As such, it was not surprising to find that the participants who watched the video were also more motivated to engage in PFME to reduce the risk of PFM dysfunction. Increasing the participants’ knowledge and beliefs appeared to lead to the action of implementing a PFME programme. Based on these results, providing web-based PFM education, while a novel method of delivering the education for pregnant women, is likely to encourage these women to change behaviour and participate in a PFME programme designed to maintain or improve PFM function during pregnancy.

At baseline, participants in the control group had a greater belief that reminding themselves to do the PFME would be easy compared to participants in the intervention group. However, results showed that significantly more participants in the intervention group adhered to a PFME programme compared to participants in the control group. The HBM conceptualises that providing participants with knowledge, benefits of changing behaviour, methods of overcoming barriers and cues to action through web-based education made it more likely that participants would develop a positive intention and subsequently engage in the behavior. This has also been demonstrated in other non-web-based interventions where women with UI showed increased adherence to a PFME programme after receiving education (Alewijnse, Mesters, et al., 2003; Alewijnse, Metsemakers, et al., 2003; Chiarelli & Cockburn, 2002; Hines, Messer, Raghunathan, Diokno, & Sampselle, 2007).

The web-based PFM education intervention, which was based on the HBM, (Janz & Becker, 1984; Rosenstock, 1974a), proposes that patient adherence can be enhanced if patients have the awareness of the risks they face and the knowledge and skills to perform strategies that could reduce their risk of developing PFM dysfunction. The results of this study are supportive of previous research which found that women are more likely to engage in and adhere to a PFME programme when firstly they believe that the behaviour is likely to have a beneficial outcome and secondly when they have the self-efficacy (Chiarelli & Cockburn, 1999) to perform the behaviour.

The effectiveness of the web-based PFM education may also be explained by the principles of andragogy (Conrad & Donaldson, 2011; Knowles, 1970; Kolb, 1984; Mainemelis et al., 2002; Merriam & Bierema, 2014; Queensland Occupational Therapy Fieldwork Collaborative, 2007), which postulate that visual and auditory modes of education allow for different learning styles of participants. Findings from previous studies (Fine et al., 2007; Haddow et al., 2005; Whitford et al., 2007a) suggest that adult learning principles and a multi-faceted approach can encompass the many different preferences for learning styles and may be important in the area of ANE. Taking these principles and preferences into consideration, the video in the present research was designed to run for only five minutes and present the most essential information on PFM and PFME as modelled in a previous successful study designed to increase patient's knowledge of diabetes (Kandula et al., 2009). The aim of the web-based PFM education was to encourage participants to watch the education, keep their interest and not "drown" the participants with information. Kandula et al. (2009) recommended adding material that could be printed to web-based education to help reinforce the information especially amongst individuals with low literacy. The “tips” sheet was designed to be printed; saved on a phone or computer; displayed in a prominent place to act as a reminder or cue to do PFME. The “tips” sheet also provided additional education on reputable websites, where, how and why to seek help or further information on PFM and PFME.

Nine participants in the intervention group reported watching the video twice and five participants watched it thrice. Recommendations are that education on PFM and PFME consist of at least two instruction sessions in the perinatal period (Fine et al., 2007; Haddow et al., 2005). Repeatedly engaging in the education may have led to increased knowledge by the participants in the intervention group. These findings form an emerging evidence-base indicating that web-based education could be a means of providing consistent reminders about how to perform PFME whereas class attendance is an irregular occurrence.

Previous research has demonstrated that by following a PFME programme people can maintain the strength of the PFM so there is a reduced likelihood of PFM dysfunction and the development of UI (Dumoulin & Hay Smith, 2010). Preventing PFM dysfunction improves patient care and quality of life for women (Boyle et al., 2012; Morkved & Bo, 1996). Internet technologies, such as this intervention may offer a feasible alternative or adjunct to attending traditional ANE classes for providing health information and should be considered in clinical practice. Of the 57.1% of participants (n = 70) who attended ANE only 21.4% reported being taught about PFME, therefore providing web-based education may form an essential adjunct where a PT who specialises in Women’s Health is not available. If the web-based PFM education programme had not been available to the participants in the intervention group, some of these women may not have received the recommended PFM education (Abrams et al., 2009; Boyle et al., 2012) during the antenatal period and thus reduced the likelihood of maintaining or improving PFM function. The participants’ interest in being recommended evidence-based and pregnancy-related web-based sites indicates that web-based programmes may have a future role in ANE and care.

### 6.61 Feasibility.

There was a drop-out rate of 13 (37.1%) in the control group and 10 (28.6%) in the intervention group during the trial, which included one (2.9%) participant from each group who withdrew due to ill-health. It has been found that continence research (Ismail, 2009) (Imamura et al., 2010) has a low level of adherence to PFME. Accordingly, a recommendation from the research (Mason et al., 2001b) is that encouragement to undertake a regular PFME be included in any education programme for pregnant women as short term adherence to a PFME programme appears to be a predictor of long term adherence (Alewijnse, Mesters, et al., 2003). Whether, as suggested previously in this section, more people dropped-out of the control group because they did not receive the education intervention which may have acted as a catalyst to continue participating in the research, is unknown.

The Internet was the most frequent resource used by participants in both groups to seek further information on PFM and PFME. Greater than double the number of participants used the Internet compared to asking for information from midwives. Participants responded that they would have liked more information on PFM or PFME. Also almost 100% of participants responded that they would have liked recommendations on evidence-based and pregnancy-related web-sites. These responses reinforce the benefits (Beranova & Sykes, 2007; Bernhardt & Felter, 2004; Murray et al., 2009; Rhodes et al., 1997) of providing a web-based and evidence-based strategy for education on PFM and PFME which may enable consistent care for pregnant women. Web-based education may have the potential to improve the education of pregnant women with low literacy skills (Kandula et al., 2009), which may include women who speak LOTE, by presenting information designed to cater for multiple learning styles in LOTE.

The effectiveness of the web-based delivery in modifying the intervention group participants' knowledge, beliefs, confidence and action (adherence) demonstrated that this is a feasible method of offering PFM education. These areas included participants' self-perceived knowledge of risk of PFM dysfunction and perhaps developing UI, the benefits of undertaking a PFME programme, the knowledge of strategies and confidence in and belief about undertaking a PFME programme. These findings indicate that a web-based education programme is a novel approach for delivery of education on PFM designed to maintain or improve PFM function in primiparae women during pregnancy.

### 6.70 Strengths and Limitations of the Pilot Randomised Controlled Trial

The study was a pilot trial but used a randomised design which is a robust method of evaluating interventions (Portney & Watkins, 2009). The trial used a validated model of health behaviour (HBM) and an intervention made by a PT who specialised in Women's Health. The trial can add to the limited published research related to PFME training using a web-based format. More research is required to examine whether the behaviour change in the intervention group was accompanied by correct technique of performing PFME. The intervention was similar to ANE class instruction of PFME where the woman does not receive a vaginal or real time ultrasound examination to test their skill in performing PFME. Future trials could test the web-based ANE and compare this with a face-to-face group to compare the skill development of performing PFME in each group.

It was possible for participants in the intervention group to report having watched the web-based PFM education programme without actually having watched it. However, after questioning the participants in the intervention group, post-intervention, regarding information presented in the video, and examining the trial results, particularly the baseline and post-education results, the researchers were able to conclude that these participants had watched the web-based PFM education programme. Short-term behavioural changes are of limited value if they don't lead to long-term adherence. It is well known that uptake (short-term adherence) to PFME is much higher than long-term adherence (Alewijnse, Mesters, et al., 2003). Measuring only short-term adherence is a limitation to the study. However, this was a novel intervention and further trials are required. The Australian health system is a first world system therefore the population in the trial may not be significantly different to other states in Australia and other developed countries.

Throughout the trial, participants reported technical problems such as the inability to download the participant diary; problems with access to the Internet; changing email address; two women informing the researcher that they had completed the final questionnaires using Survey Monkey but the questionnaires were not available in Survey Monkey; and lack of credit to allow connection by Internet or telephone. In the literature technical issues have been reported as barriers to web-based education (Cook, 2007).

Other reasons for non-completion by participants were that they hung up the phone when contacted; did not answer the phone; had not watched the web-based PFM education programme; were too busy; moving house; attending antenatal appointments; and in full-time employment. The researcher had to ring between one and ten times to either make initial contact with the participants or to conduct the interview at a time that was convenient to the participant. Lack of engagement by participants can be a feature of all trials (Landorf, 2013). However, another reason that trials such as the present research can experience drop-out, is that the evaluation of web-based technologies may not allow the researchers to develop a working face-to-face relationship with participants (Granello & Wheaton, 2004). The present research recruited a sample to allow drop-out, which enabled successful statistical evaluation of the intervention to be conducted.

### 6.71 Conclusions.

This trial demonstrates that web-based PFM education can increase knowledge about PFM, confidence in and beliefs about engaging in a PFME, and encourage adherence to a PFME programme in primiparae women when provided in addition to usual antenatal care compared to the provision of usual antenatal care alone. The intervention employed a previously validated and empirically tested health education model, HBM, as a framework for its development (Janz & Becker, 1984; Rosenstock, 1974a). This model has previously been successful for conceptualising health behaviours in a wide range of health areas, but to the researcher's knowledge this is the first time the HBM has been used to evaluate web-based PFM education in primiparae women. Further research to identify the most clinically effective and economically efficient approaches to providing PFM education for the pregnant women, is warrented.

# CHAPTER 7

## Summary of Research, Conclusions and Recommendations

### Overview

This chapter summarises the results of the two phases of the research that were conducted as part of this thesis.  The results of the studies are synthesised according to how they address the specific aims, culminating in a synthesis of the findings that contribute to addressing the general objectives of the thesis.  The objective of Phase 1, was to audit of the delivery of ANE by PT in 2012 in WA.  The objective of Phase 2 was to evaluate the effect of delivering a web-based PFM education intervention in addition to usual antenatal care on primiparae women's awareness; knowledge; confidence in and beliefs about engaging in and adhering to a PFME programme compared to provision of usual antenatal care alone.  The strengths and limitations of the research are presented followed by the conclusions and recommendations for clinical practice.

### 7.10  Synthesis of results

The synthesis of results of the audit of ANE facilitated by PT in WA in public hospitals (Chapter 4); survey of pregnant women in WA to evaluate their knowledge, beliefs about and engagement in PFM exercises (Chapter 5); and the pilot RCT which evaluated the effect of web-based PFM education (Chapter 6) are discussed in the following sections.  These results are discussed in association with the specific aims of the thesis.

The primary aims were to:

1. Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on awareness and knowledge of PFM and PFME compared to usual antenatal care alone;
2. Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on confidence in and belief about engaging in a PFME programme compared to usual antenatal care alone;
3. Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on adherence to a PFME programme compared to usual antenatal care alone.

The secondary aims were to:

4. Identify the locations; number of women attending; qualifications of physiotherapists involved; allocation of physiotherapy hours; content of education; and strategies used to enhance learning in the ANE classes provided by PT employed in hospitals funded by the DOHWA;
5. Evaluate pregnant women's awareness and knowledge about PFM and PFME; their self-reported engagement in PFME; and attendance at ANE;
6. Evaluate the frequency of self-reported UI in pregnant women in WA.
7. Evaluate pregnant women's usage of the Internet to search for pregnancy-related topics and which topics are sought.

Note that in the synthesis that follows, Aim 5 is not discussed separately but incorporated into the discussions pertaining to Aims 1, 3 and 4.

### 7.11 Primary aims.

The results that pertain to the primary aims of the research (Aims 1 – 3) are presented below.

> Aim 1: Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on awareness and knowledge of PFM and PFME compared to usual antenatal care alone.

Of the pregnant women surveyed during the research greater than 76% of women knew that PFM prevents UI and greater than 54% of women responded that the PFM are located around the urethra. However, most respondents did not know that PFM prevents faecal incontinence (72.7%), support the back (88.6%) and are located around the anus (92.9%). Subsequently the results from the pilot RCT demonstrated that providing a web-based PFM education programme was a feasible means of raising knowledge and awareness of PFM and PFME. Participants in the intervention group demonstrated significantly higher levels of knowledge of the anatomy and function of the PFM, after receiving the web-based PFM education intervention compared to the participants in the control group.  Qualitative results also demonstrated that participants who received the web-based PFM education reported learning about the "knack", which was new knowledge to the participants.

This raised knowledge of and awareness about PFM function was also evident in relation to UI.  Participants who received the web-based PFM education demonstrated a significantly higher knowledge that UI is due to PFM dysfunction compared to participants in the control group.  At follow-up, a higher percentage of participants in the intervention group compared to the control group were aware that there was treatment available for UI during pregnancy.  This was important as previous studies (reviewed in Chapter 2) have found that women can have low levels of seeking help for UI (Buckley & Lapitan, 2010; Chiarelli & Brown, 1999; Mason et al., 2001c; Roberts et al., 1998) and think that UI could be a normal occurrence during pregnancy.

> Aim 2:  Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on confidence in and belief about engaging in a PFME programme compared to usual antenatal care alone.

Responses from women in the cross-sectional survey (Phase 2, Study 1) demonstrated that both primiparae and multiparae women had low levels of confidence in and belief about engaging in a PFME programme.  Participants who were enrolled in the pilot RCT demonstrated the same responses at baseline.  Participants who subsequently received the web-based PFM education showed significantly increased levels of confidence in and belief about their ability to engage in a PFME programme compared to the participants in the control group.  Participants in the intervention group were also more confident (motivated) and had increased belief about their ability to participate in PFME when they were busy compared to the control group.  Participants who subsequently received the web-based PFM education also showed significantly increased levels of confidence in and belief about engaging in functional PFME compared to the control group.  Participants who received the web-based PFM education also responded and reported that they felt confident to practise the “knack”, which required a change in health behaviour as the “knack” was a new PFME technique for the participants.

> Aim 3: Evaluate the effect of delivering a web-based PFM education programme to primiparae women in addition to usual antenatal care on adherence to a PFME programme compared to usual antenatal care alone.

Responses from women surveyed demonstrated that respondents who spoke LOTE were significantly less likely to be engaging in PFME than women who spoke English; and that less than 12% of the whole sample were engaging in a PFME programme. Prior to receiving the web-based intervention, participants in the pilot RCT demonstrated the same traits. However, after participating in the web-based PFM education programme, participants in the intervention group showed significantly higher levels of adherence to a PFME programme between 22 to 35 weeks’ gestation compared to the participants in the control group.

The research intervention was designed, delivered and evaluated using the constructs of the HBM. During the semi-structured interviews, the responses from the participants regarding the web-based PFM education intervention were overwhelmingly positive. All of the participants interviewed agreed that the web-based PFM was helpful in allowing them to gain understanding about PFM and PFME, such as how to undertake PFME correctly and learning the “knack”. At follow-up greater than 60% of participants who completed the trial (n = 25) reported that they would watch the web-based PFM education programme again or recommend it to a friend. The results described above strongly suggest that education designed and delivered using the constructs of the HBM effectively facilitates changes in awareness, knowledge, confidence in and belief about PFM and PFME, and subsequent adherence to a PFME programme.

### 7.12 Secondary aims.

The results that pertain to the secondary aims of the research (Aims 4 – 7) are presented below.

> Aim 4: Identify the locations; number of women attending; qualifications of PT involved; allocation of physiotherapy hours; content of education; and strategies used to enhance learning in the ANE classes provided by PT employed in hospitals funded by the DOHWA.

Phase 1 of the research (Wilson et al., 2014), identified the locations; number of women attending; qualifications of physiotherapists involved; allocation of physiotherapy hours; content of education; and strategies used to enhance learning in the ANE classes provided by PT employed in hospitals funded by the DOHWA. The two main findings from this audit were the variation noted in prescription of PFME and that fewer than 50% of primiparae women attended ANE funded by the DOHWA.

The audit of the content of ANE facilitated by PT demonstrated variable results for the prescription of PFME (Wilson et al., 2014), particularly regarding the recommendations for frequency of practise of PFME. There are evidence-based recommendations for the prescription of PFME for SUI during pregnancy (Morkved, 2007). This variety in the recommendations for prescription of PFME at ANE strongly suggests the need for a consistent evidence-based strategy to inform both PT and pregnant women of the correct evidence-based prescription for PFME. Web-based PFM education may be one such strategy for achieving this goal.

The audit of the attendees at ANE facilitated by PT demonstrated that fewer than 50% of primiparae women had attended ANE in WA. These results were later confirmed by the responses from Phase 2 (Study 1) which demonstrated that 40% of multiparae women had attended ANE during a previous pregnancy despite 61.8% of primiparae women reporting that they were planning to attend ANE. Overall, the results indicated that fewer than 50% of primiparae women in WA attend ANE but due to low numbers of private patients in the trial it is not possible to distinguish between public and private patients. This highlights the importance of other means of delivering PFM education such as the novel intervention trialled in this research.

Results from Phase 2, (Study 1) demonstrated that English speaking women were significantly more likely to have attended ANE during a previous pregnancy compared to women who spoke LOTE. These findings are of concern because women who were practicing PFME were significantly more likely to have attended ANE than women who were not practicing PFME and respondents who had attended ANE had a significantly greater knowledge of the function and anatomy of PFM compared to respondents who had not attended ANE. This means that women from migrant backgrounds in WA may not be receiving evidence-based information about PFM and support to engage in PFME. Current research on ANE, which has not focused specifically on physiotherapy-related topics, demonstrates that there is limited evidence to support the efficacy of the classes (Gagnon & Sandall, 2007). However, antenatal education classes are considered by experts to be an important adjunct to antenatal care (Banta, 2003; Fabian et al., 2005; Gagnon & Sandall, 2007; Hay-Smith, 2013; Svensson et al., 2009; Tighe, 2010) and as demonstrated by responses in the present research can be a strategy for educating pregnant women about PFM and PFME.

Phase 1 also identified the locations; qualifications of physiotherapists involved; allocation of physiotherapy hours; and strategies used to enhance participant learning at ANE. Additional new information from the audit that is now available throughout WA shows that five sites were identified as not having input from PT at ANE and one site as not providing ANE. Since the audit, PT in the South West Region of WA have contacted the researcher and informed her that PT are no longer employed to provide ANE at DOHWA sites in that region. A recommendation is that managers at the DOHWA examine strategies on how more PT could be employed to deliver ANE. Three health sites employed private PT to facilitate ANE and this is an example of a strategy currently used by managers at DOHWA sites if an onsite PT is unavailable to provide ANE. Few of the PT facilitating ANE were undertaking formal qualifications in

Continence and Women's Health. A recommendation (Newman et al., 2010) is that PT employed to deliver information on continence have the requisite education and training. This novel web-based PFM education intervention could be implemented and trialled at sites with no input at ANE by PT.

Aim 6: Evaluate the frequency of self-reported UI in pregnant women in WA.

The cross-sectional survey confirmed that, as demonstrated in previous research conducted in other settings (Buckley & Lapitan, 2010; Rortveit et al., 2003), (Buckley & Lapitan, 2010; Rortveit et al., 2003) UI is a problem for pregnant women in WA. Almost 50% of women surveyed reported that they experienced at least one episode of UI during their pregnancy. Therefore, these are valuable new findings as these data are not currently collected by the DOHWA (October 29, 2012). If by following the advice given in the web-based PFM education programme people can maintain or improve the function of their PFM this may reduce the prevalence of UI and the psychological, physical and monetary costs associated with UI both personally and to health care systems. Apart from possibly averting personal trauma, preventing acute UI from becoming a chronic problem the implementation of the web-based education also has the potential to reduce or redirect national and local health care costs. The research did not, however, determine the type of UI, amount of leakage with each episode or if the self-reported UI was a pre-existing condition. Therefore, future research should be conducted to further explore this problem and further identify effective interventions, including the effects of using web-based PFM education which has not been established in the literature, for preventing UI that are specific for pregnant women.

Aim 7: Evaluate pregnant women's usage of the Internet to search for pregnancy-related topics and which topics are sought.

The survey found that over 80% of pregnant women access the Internet and many women download pregnancy-related Apps. As fewer than 50% of primiparae women attend ANE, there are potential benefits in further research that uses this web-based PFM education programme to evaluate changes in PFM function and facilitation. The use of the Internet by pregnant women to gain information on pregnancy-related topics and to download Apps supports studies undertaken in other populations (Larsson, 2009; Lima-Pereira et al., 2012; Stephen & Cumming, 2012). Web-based education has also been demonstrated to be effective in increasing knowledge, supporting beliefs and assisting client's decision making and also saving travel time by educating people in their own homes (Beranova & Sykes, 2007; Bernhardt & Felter, 2004; Cook, 2007; Kandula et al., 2009; Murray et al., 2009). The present research has demonstrated that web-based PFM education can increase knowledge, support beliefs about and encourage adherence to a PFME programme. Given the large geographical size of WA and the extensive usage of the Internet, there is potential for this web-based PFM education to be effective in saving women travel time to ANE and providing them with education at a time convenient to them.

The web-based PFM education programme was designed to encourage pregnant women to seek further advice and treatment if needed for PFM dysfunction and was not designed as a treatment programme. Web-sites and details of how and where to seek advice and treatment were emailed to the participants in the "tips" sheet. The web-based PFM education was aimed at raising awareness and knowledge of PFM and PFME and encouraging adherence to a PFME programme. As discussed in previous research studies (Bo, 2007b; Haddow et al., 2005; Neumann et al., 2005b; Price et al., 2010) it is imperative that women practise the correct facilitation or elevation of PFM in order to maintain the function of the PFM and reduce or prevent UI. It has been found on assessment with ultrasound, that approximately one third of people depress their PFM during a PFM contraction instead of elevating the PFM (Thompson & O'Sullivan, 2003). The use of PFM web-based education in the pilot RCT reflected current teaching of PFME during ANE in WA, where attenders are not commonly checked with ultrasound or vaginal examination (Fine et al., 2007) to ensure the correct elevation of the PFM. Other possible benefits of the present research are being able to provide PFME directly to women, whilst they wait at antenatal clinics or doctors' surgeries; to women with disabilities or young children who have difficulty leaving home; and attending exercise classes through an evidence-based link on the Internet. Health professionals could also access and use the information, which may assist in the delivery of the recommended prescription of PFM education to an increased number of pregnant women.

Greater than 67% of the participants who completed the follow-up questionnaire down-loaded pregnancy-related Apps. As stated previously in Chapter 2 (Section 2.8), the Continence Foundation of Australia has recently released a PFME Safe App (Continence Foundation of Australia, 2013). The researcher has communicated with PT who specialise in Continence and Women's Health (personal communication, October 29, 2014) and they are currently recommending the PFME Safe App for use on mobile phones. These PT are in a role where they could recommended a web-based PFM education programme that is evidence-based to pregnant women during a consultation.

A web-based PFM education programme is a feasible method of education for pregnant women. Providing a link to web-based PFM education as an adjunct to providing face-to-face ANE may result in an increased number of women maintaining optimal function of the PFM and adhering to a PFME programme. Links to alternative PFM education web-sites with subtitles in LOTE could be provided as part of routine visit to antenatal clinics.

***Summary.***

In summary, the present research has demonstrated that web-based PFM education is a feasible method of delivering education to pregnant women which resulted in new findings. Results demonstrate that a novel web-based PFM education programme designed and delivered by a PT, who specialised in Women's Health, and provided in addition to usual antenatal care, is an effective method of increasing awareness and knowledge of PFM; confidence in and belief about engaging in PFME; and increased adherence to a PFME programme compared to the provision of usual antenatal care alone. The web-based intervention was designed using the constructs of the HBM and this was found to be suitable for the delivery of PFM education to pregnant women. The HBM constructs allowed robust linking of awareness and knowledge of PFM and PFME to the desired outcome of the uptake of a new health behaviour of practicing PFME. The survey items also measured the constructs of the HBM (such as knowledge, confidence, beliefs and adherence) so the participants' ratings of both the content and OM could be interpreted confidently. However this was the first time to the researcher's knowledge that health behaviour change theory has been used to design a web-based intervention for pregnant women. This web-based PFM education can also be adapted to cater for adult learning; women who speak LOTE; and could be effective at reaching large numbers of women as many women use the Internet for seeking information on pregnancy-related topics. If a health worker does not have expertise in the prescription of PFME providing a link to this type of web-based PFM education as an adjunct to providing face-to-face ANE may result in an increased number of women maintaining optimal function of the PFM and adhering to a PFME programme. Links to alternative PFM education web-sites, such as those provided in the "tips" sheet, but with subtitles in LOTE could be provided as part of routine visits to antenatal clinics.

## 7.20 Strengths and Limitations of the Research

### *Strengths of the Research.*

The questionnaires were based on identified items and previous findings from the literature reviewed in Chapter 2. All the questionnaires were evaluated by PT with Continence and Women's Health qualifications for content and ease of comprehension. The questionnaire in Phase 1 used items whose constructs were based on physiotherapy and pregnancy-related topics identified in the research. The questionnaires in Phase 2 were also designed using items which again reflected the domains of interest identified in previous research studies (Alewijnse et al., 2001; Alewijnse, Metsemakers, et al., 2003; Chen, 2004; Chiarelli & Brown, 1999; Fine et al., 2007; Gillard & Shamley, 2010; Sampselle et al., 1998; Whitford et al., 2007b). The questionnaires in Phase 2 were piloted by pregnant women prior to implementing the cross-sectional survey and the pilot RCT. The pilot trial was a randomised study which is the preferred, recommended design for this type of study (Portney & Watkins, 2009).

All the research was undertaken by the researcher including recruitment of the majority of participants with face-to-face contact at antenatal or ultrasound clinics which often included meeting and informing the participant's support person about the research as well. Participants (and the support person) were given an explanation of how to fill in the dairy and advised of the definition of UI. The use of one person with experience in women's health to undertake the research ensured evidence-based and consistent information on continence issues and ANE as well as encouragement of any support people to be involved in reminding the participant to complete and return measurement tools. In the pilot RCT outcomes of frequency of PFME and UI were measured using a recommended data collection method in the form of a diary (Alewijnse, Mesters, et al., 2003; Locher et al., 2001; Neumann et al., 2005b; Peat et al., 2002; Reilly et al., 2002; Wyman et al., 1988).

By surveying pregnant women, after also surveying the PT delivering ANE, results from both groups of stakeholders confirmed that fewer than 50% of primiparae women attend ANE in WA. The use of interviews as an additional method of data collection in the pilot RCT also allowed for qualitative analysis of these data to explain results from the quantitative data in a way that enhanced the quality of information, confirmed and reinforced the results.

As an adjunct to PFM education, information on good bladder habits, good bowel habits, how childbirth might affect the PFM, the effect of aging and menopause on the bladder and PFM are often taught. These are thought to be important topics of information (Chiarelli & Cockburn, 1999) that are often delivered either at ANE or postnatally on the ward. Because the aim was to keep the video short it was not possible to include these topics. The "tips" sheet directed women to appropriate web-sites, health workers or a book that could provide this information.

***Limitations.***

Recommendations are that when women undertake a PFME programme the correct facilitation involving elevation of PFM is paramount (Bo, 2007b; Haddow et al., 2005; Neumann et al., 2005b; Price et al., 2010). Although participants in the pilot RCT reported that the intervention taught them how to do PFME correctly, this intervention was similar in one aspect to conducting PFME in ANE classes. It was not possible to evaluate the PFM contraction with the use of real-time ultrasound during the trial to ensure that participants were elevating their PFM, relaxing their accessory muscles and breathing correctly. Further research could compare the effectiveness of web-based PFM education compared to conducting PFME in ANE classes on pregnant women's ability to do PFME correctly. Future research could also evaluate the PFME skills learnt in a face-to-face interaction with a PT compared to PFME skills learnt when providing the education through a web-based format.

The use of surveys and semi-structured interviews to collect data has limitations. The percentage of surveys returned is usually in the range of 30 to 60% (Alewijnse, Mesters, et al., 2003; Portney & Watkins, 2009) and this was reflected in the low return of the postal surveys 22/200 (11%) during Phase 2 (Study1). However, the semi-structured interviews allowed discussion with an educator and an opportunity to ask questions, thus mitigating this limitation during Study 2.

A regular OM used in the research to evaluate the effectiveness of a PFME programme is frequency and amount of UI. This was not an aim of the present pilot study which was not powered to show the effect of the PFM education on the frequency of UI in pregnant women. The web-based PFM education intervention was effective in meeting the aims and the effect size of these results can thus inform the design of future research with a larger study, which can include the frequency of UI as a primary outcome.

Previous research (Lewis, 1999; Rhodes et al., 1997) has suggested that to improve OM and achieve greater effectiveness with changes in health behaviour, individual tailor-made education is recommended. The web-based intervention was similar to current

ANE class techniques, as it was not possible to tailor the intervention to match the stage of change of behaviour of the individual participants. Further research could evaluate the provision of this education using web-based tailored options which include items such as web page design and mouse click options. This has been shown to be an effective method in other forms of exercise programmes (Nyman & Yardley, 2009).

While administering the questionnaires, the researcher noted that on more than one occasion, the participants demonstrated low levels of competence in speaking and reading English. Conducting surveys in LOTE may ensure more accurate collection of data. Pregnant women may require alternative modes of education, especially for women who speak LOTE. Airing a PFM education video with sub-titles in LOTE in the antenatal clinic waiting rooms may be a method of educating the non-attenders of ANE and could assist pregnant women to receive appropriate pregnancy-related information in a timely manner. The Internet is a well-received tool used by pregnant women to search for information on pregnancy-related topics.

### 7.30 Conclusions

This research has provided new insights into the type of design and delivery that can be utilised to provide effective web-based PFM education to primiparae women but due to the amount of missing data caution needs to be used in the interpretation of the results. Some women may prefer to attend ANE classes to learn about PFME, so providing women with a link to an evidence-based web-site also gives them the option of accessing new consistent evidence-based information as an adjunct to ANE. Results demonstrate that a web-based PFM education programme in addition to usual antenatal care is an effective method of increasing awareness and knowledge of PFM; confidence in and belief about engaging in PFME; and increased adherence to a PFME programme compared to usual antenatal care alone.

This is the first trial to examine the effects of a novel web-based PFM education programme designed by a PT who specialises in Women's Health in addition to usual antenatal care for pregnant women on engagement in PFME. This intervention showed promising positive effects which provides a compelling rationale for further large, well-designed RCT to determine whether web-based interventions aimed at encouraging maintenance or improving the function of PFM and preventing UI in pregnant women are efficacious. Given the high use of the Internet for seeking pregnancy-related information it may be an alternative and more flexible mode of education on pregnancy.

### 7.40 Recommendations

There is a need for antenatal services to be reorganised so that all women have the opportunity to receive evidence-based education about PFM function and instructions on PFME during pregnancy and are encouraged to practise and adhere to a PFME programme. Midwives and PT, having been appropriately trained, may be key health professionals who could feasibly provide information on PFM and PFME as they see women regularly in the antenatal period. However, web-based education like the programme evaluated in this research should be considered as a single option or as an adjunct to ANE. Given that large numbers of women are not attending ANE future trials should compare the outcomes of providing PFME using a web-based programme with providing PFME at ANE classes. Additionally, given that a high number of respondents planned to attend ANE but fewer than 50% actually attended ANE, more research is needed to establish why women do not attend ANE, including research into new methods of providing ANE.

Pregnant women increasingly use the Internet to seek pregnancy-related information, download Apps and reported a willingness to access web-based ANE. Recommendations by health service providers, particularly midwives, to high-quality web-sites such as the Continence Foundation of Australia and the government web-site (Australian Government, 2009; Continence Foundation of Australia, 2014) may also increase the knowledge, awareness and adherence to PFME programmes. These strategies may maintain or improve PFM function and reduce or prevent long term UI. These high quality web-sites have links to information in English and a number of LOTE and should be recommended to pregnant women. New methods to be researched ought to include web-based education streamed such as that evaluated in the present research, Webinars, interactive web-sites, tools such as Apps and alarms on smart phones to act as a reminder to do PFME. These web-based methods of education could become valuable resources.

The women with a background in LOTE had less awareness, knowledge and understanding of PFM and PFME than English speaking women and were less likely to have attended ANE. The web-based PFM education provided a catalyst for women to engage in and adhere to a PFME programme and could be adapted for women who speak LOTE. The present research recommends that additional antenatal resources and strategies could be developed to focus on migrant women of low SES incorporating strategies to overcome language barriers. Future web-based programmes should consider providing the education in other languages and also providing links to enable women to ask questions of health care professionals and "meet-up" with pregnant women living nearby to provide support particularly for women who speak LOTE.

There was a high frequency of self-reported UI in the women surveyed. Further studies are needed to establish a more accurate measure of UI in pregnant women in WA to confirm the findings of the survey conducted as part of this research. These studies should use evidence-based objective tools such as the pad test and the International Consultation on Incontinence Questionnaire (Avery et al., 2004; Lose & Versi, 1992). Recommendations would be for health professionals, especially those who provide ANE, to be more aware of the extent of the problem of UI during pregnancy. During consultation with pregnant women, particularly women with medical conditions, such as smoking and increased BMI, that increase the risks of developing UI, health professionals should make explicit enquiries as to the frequency of UI, amount of leakage and whether UI was a pre-existing condition. Women with UI can then be offered an appropriate referral for professional help and be provided with links to evidence-based web-sites. Follow-up documentation, treatment by the relevant health professional and education on the health conditions and their associations with PFM dysfunction and UI during the antenatal and postnatal periods is important to maintain optimal PFM function and prevent or reduce UI.

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

**INFORMATION SHEET**

*Appendix A*

Evaluating Web-Based Pelvic Floor Muscle Education for Pregnant Women (PLS)

Dear Potential Participant

My name is Judy Wilson. I am a physiotherapist who specialises in Women's Health and am enrolled in a Doctor of Philosophy at The University of Notre Dame Australia. I am doing research throughout Western Australia (WA) involving women who are pregnant. Associate Professor Anne-Marie Hill of the School of Physiotherapy is supervising the project.

The title of the project is "Evaluating web-based pelvic floor muscle education for pregnant women". My research involves evaluating information taught on pelvic floor muscles and pelvic floor muscle exercises using the Internet in WA. The project has been approved by the Human Research Ethics Committees (HREC) of WACHS, the DOHWA and The University of Notre Dame Australia. Should you wish to contact the HREC for your area the details are on pages 3 and 4.

**Nature and Purpose of the Project**

The purpose of the study is to identify if:

- Pregnant women who do not have easy access to antenatal physiotherapy education can watch and learn important pelvic floor muscle information online.
- Pregnant women can start to do pelvic floor muscle exercises when taught online.
- You have been approached to participate in the project because you are less than 27 weeks' pregnant and are over 18 years old.

Please note there are no side effects or risks involved in doing pelvic floor exercises whilst pregnant.  You may withdraw from this research at any time without it affecting your routine management during pregnancy.

**Interested, less than 27 weeks' pregnant and more than 18 years of age?**

The first step is to finish reading this sheet and complete the questionnaire which will take 5 – 15 minutes.  The questionnaire will be returned to me at The University of Notre Dame in Fremantle.

**What next?  Would you like to participate in the online education?**

When you fill out the questionnaire, ticking the box in question 1 will allow me to use the information from this questionnaire.  If you are willing to take part in the next phase of the research please make sure you complete the contact details in question 33.  A surname is optional.  Following this if you require further education and are eligible to take further part in the research I will send you a consent form to sign, with a reply paid envelope.  If eligible you will be randomly placed in 1 of 2 groups (intervention or antenatal) and both groups will continue to receive the normal antenatal care.

Some participants will be asked to view a 5 minute education session at about 22 - 26 weeks' pregnant.  A few participants will also take part in a short interview.  You may be asked to record some information in a diary.  This will take about 20 seconds every day.  Participants will then be asked to fill in a second 10 -15 minute questionnaire at about 35 weeks' pregnant.

Data collected will be stored securely in the University's School of Health Sciences for five years.  No information will be used that can identify you or your place of residence. All information collected will be strictly confidential and number coded to maintain anonymity.

**Finally**

The results from the study will be made available to all participants. These results can help other pregnant women living in WA in the future.

The Human Research Ethics Committee of the University of Notre Dame Australia has approved the study and so has your local ethics committee. Associate Professor Anne-Marie Hill of the School of Physiotherapy is supervising the project. If you have any queries regarding the research, please contact me or Associate Professor Hill, see details below.

Thank you for your consideration and I hope you will agree to participate in this research project. If so, please return the questionnaire in the envelope supplied.

Yours sincerely

Ms Judy Wilson Tel: (08) 9443 0229 on Mon – Thurs, 0900 – 1700
School of Physiotherapy
The University of Notre Dame Australia
19 Mouat Street (PO Box 1225)
FREMANTLE 6959 Email: 20121282@my.nd.edu.au

Supervisor: Associate Professor Anne-Marie Hill Ph: (08) 9443 0239
Email: anne-marie.hill@nd.edu.au

The Executive Officer of the Human Research Ethics Committee, Research Office
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Wendy Khoo (South Metropolitan Human Research Ethics Committee)

Research Governance & Ethics Co-Ordinator,

Human Research Ethics Committee

South Metropolitan Health Service

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FREMANTLE WA 6959

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Email: wendy.khoo@health.wa.gov.au

Email: smahs.ethics@health.wa.gov.au Or

Western Australian Country Human Research Ethics Committee, Ph: (08) 9781 2027

Mr Sean Howarth (North Metropolitan Human Research Ethics Committee)

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THE UNIVERSITY OF NOTRE DAME AUSTRALIA

**CONSENT FORM**

*Appendix B*

Evaluating Web-Based Pelvic Floor Muscle Education for Pregnant Women

## INFORMED CONSENT FORM

I, *(participant's name)* ________________________________freely give my consent to being a participant in the research project "Evaluating web-based pelvic floor muscle education for pregnant women". I am over 18 years of age.

I have read and understood the Information Sheet about this project and any questions have been answered to my satisfaction by Judy Wilson and I can contact her further if I have any questions on telephone 9443 0229 or her principal supervisor Associate Professor Anne-Marie Hill on 9443 0239.

I understand that I may withdraw from participating in the project at any time without prejudice.

I understand that all information gathered by the researcher will be treated as strictly confidential, except in instances of legal requirements such as court subpoenas, freedom of information requests, or mandated reporting by some professionals.

I understand that a code will be ascribed to all participants to ensure that the risk of identification is minimised and any telephone interview will not be audio recorded.

I understand that the protocol adopted by The University of Notre Dame Australia Human Research Ethics Committee for the protection of privacy will be adhered to and relevant sections of the *Privacy Act* are available at http://www.nhmrc.gov.au/

I agree that any research data gathered for the study may be published provided my name or other identifying information is not disclosed.

| | | | |
|---|---|---|---|
| **PARTICIPANT'S SIGNATURE:** | | **DATE:** | |

| | | | |
|---|---|---|---|
| **RESEARCHER'S FULL NAME:** | JUDY WILSON | | |
| **RESEARCHER'S SIGNATURE:** | | **DATE:** | |

*If participants have any complaint regarding the manner in which a research project is conducted, it should be directed to the Executive Officer of the Human Research Ethics Committee, Research Office, The University of Notre Dame Australia, PO Box 1225 Fremantle WA 6959, phone (08) 9433 0943, email research@nd.edu.au* Or

Email: wachs.researchethicscommittee@health.wa.gov.au Ph: 0417 068 594

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*Appendix C*

Pre-Intervention Questionnaire at or Prior to 27 Weeks' Gestation

Thank you very much for completing this questionnaire. It will take about 10 minutes to complete. Your time and answers may help to improve the antenatal education services in your area.

**1.** Are you happy for the researcher to report this information anonymously (no names included)?

- ☐ Yes
- ☐ No

**2.** Do you plan to attend antenatal education or parent classes before your baby is born? (tick all that apply)

- ☐ No
- ☐ Yes
- ☐ Not available
- ☐ Don't know
- ☐ Attended this pregnancy
- ☐ Attended during previous pregnancy

**3.** If you answered NOT AVAILABLE to Question 2, would you attend an antenatal education or parent class if it was available?

- ☐ No
- ☐ Don't know
- ☐ Yes

**4.** If available would you attend an antenatal education class using the Internet?

- ☐ No
- ☐ Don't know
- ☐ Yes

**5.** Have you heard of your pelvic floor muscles?

- ☐ No
- ☐ Don't know
- ☐ Yes

**6.** If you answered YES to Question 5, where did you hear or receive information on your pelvic floor muscles? (tick all that apply)

- ☐ Physiotherapist
- ☐ Nurse/Midwife
- ☐ Book
- ☐ Internet
- ☐ Other (name) ……………………................................

**7.** To your knowledge have you ever exercised your pelvic floor muscles?

- ☐ No
- ☐ Don't know
- ☐ Yes
- ☐ Doing pelvic floor exercises

**8.** What do your pelvic floor muscles do? (tick all that apply)

- ☐ A Stop leakage of urine or wee
- ☐ B Stop leakage of faeces, pooh or stool
- ☐ C Support your back
- ☐ A and B
- ☐ None of the above
- ☐ Don't know

**9.** What do your pelvic floor muscles go round? (tick all that apply)

- ☐ A Bladder outlet
- ☐ B Vagina
- ☐ C Back passage
- ☐ A and B
- ☐ None of the above
- ☐ Don't know

**10.** Should your pelvic floor muscles and lower tummy muscle work together?

- ☐ Yes
- ☐ No
- ☐ Sometimes
- ☐ Don't know

**11.** Why might women leak urine when they are pregnant? Because: (tick all that apply)

- ☐ A They are pregnant
- ☐ B Their bladder is too small
- ☐ C Their pelvic floor muscles do not work properly
- ☐ A, B and C
- ☐ None of the above
- ☐ Don't know

**12.** How often should you exercise your pelvic floor muscles?

- ☐ Daily
- ☐ 2 or more times per week
- ☐ Once a week
- ☐ Never
- ☐ Don't know

**13.** Do you leak urine (wee) at any time?

☐ Never

☐ Less than once a week

☐ More than once a week

☐ Daily

☐ Don't know  Comments ………………

**14.** I think it is normal for women to leak urine (wee) when pregnant

☐ Strongly agree

☐ Agree

☐ Undecided

☐ Disagree

☐ Strongly disagree

**15.** I think there is treatment or help for women who leak urine (wee) when pregnant

☐ Strongly agree

☐ Agree

☐ Undecided

☐ Disagree

☐ Strongly disagree

**16.** If I leak urine (wee) when I am pregnant (tick all that apply)

☐ I don't know if there is treatment available

☐ I won't think it is a problem

☐ I won't ask for help as I will be embarrassed

☐ I won't ask for help as I have a male doctor

☐ I will ask for help

**17.** If I leak urine I am likely to ask the following person for help (tick all that apply)

- ☐ Physiotherapist
- ☐ Nurse / Midwife
- ☐ Doctor
- ☐ Not look for help
- ☐ Other (name) ……………....................

**18.** I believe I will start to leak urine (wee) whilst pregnant or my leakage will get worse

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**19.** If I receive information on my pelvic floor muscles I intend to follow the advice given

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**20.** If I am advised to do pelvic floor exercises I will try to do them

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**21.** If I follow the advice to do pelvic floor exercises I will become better at them

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**22.** If I follow advice to do pelvic floor exercises my pelvic floor will become stronger

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**23.** My friends have informed me that I should do pelvic floor exercises

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**24.** I will be able to follow the pelvic floor exercise advice when I am busy

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**25.** Reminding myself to do the pelvic floor exercises will be easy

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**26.** Do you believe that pelvic floor exercises will prevent or improve leakage of urine (wee)

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**27.** Do you exercise - this includes going for a walk?

- ☐ 30 minutes or more, 5 or more times a week
- ☐ 30 minutes or more, 1 – 4 times a week
- ☐ 10 - 20 minutes, 5 or more times a week
- ☐ 10 minutes, 1 – 4 times a week
- ☐ Never
- ☐ Other (name) ...........................

**28.** During the last 2 months have you searched on the Internet for information related to your pregnancy or the expected baby?

- ☐ No
- ☐ Don't know
- ☐ Yes

**29.** If YES to Question 28, what information did you look for on the Internet? (tick all that apply)

- ☐ Pelvic floor muscles (exercises)
- ☐ Bladder (leakage of urine or wee)
- ☐ Bowel (constipation/difficulty doing a pooh)
- ☐ Back pain
- ☐ Safe exercises
- ☐ Labour
- ☐ Caring for a new baby
- ☐ Other: …………………

**30.** Have you seen a physiotherapist since you were pregnant?

- ☐ No
- ☐ Don't know
- ☐ Yes
- ☐ Physiotherapist not available

**31.** If **YES to question 30**, why did you see the physiotherapist? (tick all that apply)

- ☐ Back pain
- ☐ Leaking urine (wee)
- ☐ Don't know
- ☐ Other (specify) ……..………

**32.** Please add any other comments you have about antenatal education, thank you.

……………………………………………........................................................................

**33.** If you are happy to take part in further research, as described in the information sheet, please fill in the following details so that I may contact you. These details will not remain on file and will only be used to contact you.

First Name:………………… Surname (optional) ………………..................

Address: ……………Street/PO Box: ………. Town: ...................................

Post Code: …………………………... Telephone Number: …………………

Email address: ……………………………...................................................

**34** If you do not wish to take part in further research can you please supply the following:

Town where you live: ………………................ Post Code: .....................

**35** Where do you plan to have your baby?

☐ At home Hospital/town: ………… Post code (if known) ..................

**36** In kilometers, how far from your home, will you have your baby?

……………

**37** Your date of birth?

......................... (dd / mm / yyyy)

**38** How many weeks' pregnant are you?

.......................................

**39** How many children do you have?

☐ 2 or more

☐ 1

☐ 0

☐ Other .........

**40** What was your weight BEFORE you were pregnant?

…………..kgs Or ………lbs

**41** How tall are you?

………..cms Or ………. Ins

**42** Marital status?

- ☐ Married/Partner
- ☐ Widowed
- ☐ Single

**43** Do you receive a pension (eg Newstart, Disability)?

- ☐ Yes
- ☐ No
- ☐ Don’t know

**44** Are you employed?

- ☐ Yes
- ☐ No
- ☐ Occasionally

**45** What is your level of education?

- ☐ Completed University
- ☐ Am a midwife, doctor or physiotherapist
- ☐ Completed year 12 only
- ☐ Completed year 10 only
- ☐ Apprenticeship, TAFE
- ☐ Other (specify) ……….

**46** Are you Aboriginal Torres Strait Islander?

- ☐ Yes
- ☐ No

**47** In which country were you born?

- ☐ Australia
- ☐ New Zealand
- ☐ United Kingdom
- ☐ Other …………………………..

**48** If you were NOT BORN in Australia, the number of years lived in Australia?

- ☐ 0-6 years
- ☐ More than 6 years

**49** Is English the first language spoken in your home?

- ☐ Yes
- ☐ No - What language do you speak at home ………......

**50** Do you smoke?

- ☐ Yes
- ☐ No
- ☐ Occasionally
- ☐ Stopped during pregnancy

**51** Do you have any medical conditions? (tick all that apply)

- ☐ Muscle weakness eg Stroke, Cerebral Palsy, Multiple Sclerosis
- ☐ Asthma or regular cough
- ☐ Irritable bowel syndrome
- ☐ Frequent difficulty opening bowels – constipation and straining
- ☐ No medical conditions
- ☐ Other (specify) …………………..

**52** Any additional comments are welcome?

..................................................................................................................

Thank you for your valuable time. Please return this questionnaire in the envelope provided.

If you have any queries or issues you feel have not been satisfactorily addressed in this survey please contact Judy Wilson, PhD Candidate and Physiotherapist:
Email: judy.wilson1@my.nd.edu.au Ph: (08) 9443 0229 on Mon – Thurs, 0900 – 1700
Or

Supervisor: Associate Professor Anne-Marie Hill
Email: anne-marie.hill@nd.edu.au Ph: (08) 9443 0239 Or

If you have any concerns or complaints about this research project please contact:
Research Office, The University of Notre Dame Australia
Email: research@nd.edu.au Ph: (08) 9433 0964 Or

Wendy Khoo (South Metropolitan Human Research Ethics Committee)
Research Governance & Ethics Co-Ordinator,
Human Research Ethics Committee
South Metropolitan Health Service
PO Box 480,
FREMANTLE WA 6959
Ph: (08) 9431-2929
Email: wendy.khoo@health.wa.gov.au
Email: smahs.ethics@health.wa.gov.au Or

Western Australian Country Human Research Ethics Committee, Ph: (08) 9781 2027
Or

Mr Sean Howarth (North Metropolitan Human Research Ethics Committee)
Executive Officer, Human Research Ethics Committee
2nd Floor A Block
Sir Charles Gairdner Hospital
Hospital Avenue
NEDLANDS  WA  6009
Ph:  (08) 9346 2999
Email:  SCGH.HREC@health.wa.gov.au

Thank you for your valuable time.  Please return this questionnaire in the envelope provided.

*Appendix D*

Email to intervention group at 22 to 26 weeks' gestation

Dear                                         Code number:

It is fantastic that you have agreed to participate in this research.  Ready to do some beneficial exercises for a future new mum?  You can NOW:

View the 5 minute online education session, as often as you like, on pelvic floor muscles so you can start exercising regularly and correctly.  Please click on this link

http://youtu.be/3Gz5tYxZ5fo  or copy and paste into YouTube

Once you have viewed the session and know how important the pelvic floor exercises are, please click this link to complete a 2 minute survey if not already done so on the YouTube link

https://www.surveymonkey.com/s/KX3WC5X

Now start your diary attached online.

Attached is an information sheet with resources and tips for your office or fridge door – keep it handy.

You may receive a call in 4 weeks to find out how you're going.

Please reply to advise that you have received this email and links work.

I will email you another survey at about 35 weeks' pregnant.

Happy exercising          Any questions?          Contact us:

| | |
|---|---|
| Judy Wilson, Ph D Candidate | Associate Professor Anne-Marie Hill |
| Women's Health Physiotherapist | Principal Supervisor |
| judy.wilson1@my.nd.edu.au | anne-marie.hill@nd.edu.au |
| Ph:  9443 0229 | Ph:  9443 0239 |

*Appendix E*

Email to control group at 22 to 26 weeks' gestation

Dear Code number:

It is fantastic that you have agreed to participate in this important and beneficial research. You have been allocated to a group and can NOW:

Start your diary attached or one will soon arrive in the mail with a reply paid envelope as discussed.

Please reply to advise that you have received this email.

I will email you another survey when you are about 35 weeks' pregnant.

Happy pregnancy

Any questions? Please contact us.


| | |
|---|---|
| Judy Wilson<br><br>Ph D Candidate & Women's Health Physiotherapist<br><br>judy.wilson1@my.nd.edu.au<br><br>Ph: 9443 0229 | Associate Professor Anne-Marie Hill<br><br>Principal Supervisor<br><br>anne-marie.hill@nd.edu.au<br><br>Ph: 9443 0239 |

*Appendix F*

Questionnaire for the Senior Physiotherapist(s) or the Physiotherapist who facilitates the Antenatal Education Classes

This electronic questionnaire was emailed to the physiotherapists employed by DOHWA with a link to Survey Monkey.

1. By filling in this survey and returning it you are consenting to partake in the research titled "An audit of the Antenatal Education that is facilitated by Physiotherapists in Western Australia". If you do not consent, we would value your reasons for not completing the survey please.

2. Did your physiotherapy service run antenatal education classes prior to 2007?
   - ☐ Yes
   - ☐ No

3. Does your PT service currently run antenatal education classes? If No – please answer next questions
   If Yes – please go to question 7.
   - ☐ Yes
   - ☐ No

4. If your answer is **No**, why Not?
   - ☐ Private physiotherapist
   - ☐ Taken by midwife
   - ☐ Lack of attendees
   - ☐ No physiotherapist available
   - ☐ Other (specify) ………………………

5. If the classes are taken by a midwife does she/he facilitate pelvic floor muscle education?

   ☐ No

   ☐ Don’t know

   ☐ Yes

Which topics (please specify) ………………………………

6. Does the midwife facilitate education commonly taught by physiotherapists eg back pain, bladder and bowel issues?

   ☐ No

   ☐ Don’t know

   ☐ Yes

   ☐ Which topics? (specify) ………………………

7. At which hospital or health centre do you work?

   ……………………………………………………

8. What is the size of the whole centre (approximate bed or patient numbers)?

   ……………………………………………………

9. How many deliveries are there per annum at your hospital?

   ……………………………………………………

10. Name the places(s) where antenatal education classes are run in your region?

    ……………………………………………………

If you answered NO to question 3 you need not answer any more questions, unless you have stopped classes in the last 2 months, then please continue with the questions. Thank you for returning the survey.

11. In your opinion is the physical environment suitable for ANE, ie bean bags, windows, enough space?

☐ Yes

☐ No

Any comments (please specify) ……………………………………………

12. How many years has the physiotherapist facilitating the antenatal education class been practicing as a physiotherapist?

☐ 0-3

☐ 4-6

☐ 7-9

☐ More than 9

13. Is the physiotherapist facilitating the antenatal education class currently undertaking any post-graduate qualifications?

☐ Yes

☐ No

If yes, which qualification: …………………………………………………

14. Do you have antenatal education classes on weekends?

☐ Yes

☐ No

15. Do you have antenatal education classes on weekdays?

☐ Yes

☐ No

16. Do you have antenatal education classes in work hours (0800 – 1700, Monday - Friday)?

☐ Yes

☐ No

17. Do you have antenatal education classes in the evening (Monday – Friday)?
    - ☐ Yes
    - ☐ No

18. How many **physiotherapy lead** classes do participants attend to complete their antenatal education course? *For example: 1 class of 3 hours, 3 classes of 1 hour, 1 class (day) of 8 hours* ..…………………………………………..

19. What is the total number of hours that each participant attends to complete a course – midwife and physiotherapist together ………………………………

20. How many series of these classes do you hold per month? *For example: 2 series classes / month.* ………………………………………

21. Over the past 2 years have the numbers at your antenatal education classes been:
    - ☐ Consistent
    - ☐ Increasing
    - ☐ Declining

Other (please specify) ……………………………………

22. Do you have an adequate number of classes for the prospective parents wishing to attend?
    - ☐ Yes
    - ☐ No
    - ☐ Don't know

23. In the last year approximately (average) how many pregnant women attend each class(es)/series?

    …………………………………………………

24. Which of the following topics do you cover in your class:

- ☐ Pelvic floor muscle function
- ☐ Pelvic floor muscle dysfunction
- ☐ Pelvic floor exercises
- ☐ Co-contraction – transversus abdominis/pelvic floor
- ☐ Back care
- ☐ Posture
- ☐ Back pain
- ☐ Pelvic girdle pain
- ☐ Exercise during pregnancy
- ☐ Labour – stages
- ☐ Labour - positions
- ☐ Breathing
- ☐ TENS in labour
- ☐ Perineal massage
- ☐ Relaxation
- ☐ Good bladder habits
- ☐ Urinary incontinence
- ☐ Good bowel habits
- ☐ Constipation

Postnatal issues:

- ☐ Urinary incontinence
- ☐ Feacal incontinence
- ☐ Perineal pain
- ☐ Prolapse
- ☐ Breast problems
- ☐ Haemorrhoids
- ☐ Exercise

Perinatal Resources:

- ☐ Websites
- ☐ Books ☐ Other (specify) ....................................

25. How often do you advice participants to do pelvic floor muscle exercises and how long to hold a contraction, for example 2 x 30 / day with a 10 second hold?

………………………………………………….

26. Do you teach Functional pelvic floor exercises?

☐ Yes

☐ No

☐ Don't know

27. Please tick each of the following methods used during your class?

☐ Ice breaker

☐ Discussion

☐ Brainstorming

☐ Group activities

☐ Overheads/

☐ PowerPoint

☐ DVD/Video

☐ Music

☐ Props – such as posters

☐ Practise pelvic floor exercises

☐ Practise positions for labour

☐ Practise back exercises

☐ Other practical activities

☐ Quiz

☐ Evaluate knowledge /

☐ Other ……………………………………………………

28. Do the participants fill out a participation evaluation form at the end of the class/series?

☐ Yes

☐ No

29. Does the evaluation form test the participant's knowledge / strategies gained by participants, for example ask them to state what causes back pain?

☐ Yes

☐ No

☐ Don't know

30. Did you or your health service prepare the information taught?

☐ Yes

☐ No

If not where did the information come from?

……………………………………………………

31. Please add any additional information on ANE or physiotherapy in your area:

……………………………………………………

Thank you very much for your co-operation.

If you have any queries or issues you feel have not been satisfactorily addressed in this survey please contact me:

Judy Wilson, PhD Candidate and Physiotherapist

Email: judy.wilson1@my.nd.edu.au Ph: (08) 9443 0229 on Mon – Thurs, 0900 – 1700

Or

Supervisor: Dr Anne-Marie Hill

Email: anne-marie.hill@nd.edu.au Ph: (08) 9443 0239 Or

Research Office, The University of Notre Dame Australia

Email: research@nd.edu.au or Ph: (08) 9433 0964 Or

Western Australian Country Human Research Ethics Committee, Ph: (08) 9781 2027

Or

Wendy Khoo (South Metropolitan Human Research Ethics Committee)
Research Governance & Ethics Co-Ordinator,
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South Metropolitan Health Service
PO Box 480,
FREMANTLE WA 6959
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*Appendix G*

Final Post-Intervention Questionnaire at 35 Weeks' (+/- 1) Gestation

Thank you very much for filling in this questionnaire. It will take about 10 – 15 minutes to complete. Your time and answers can help to develop and improve the antenatal education service in your area.

| Number | Question |
|---|---|
| **1.** | ID Code:… Or Name or email address……………………………….<br>Number of weeks' pregnant …………………………………………… |
| **2.** | How much weight have you gained during your pregnancy?<br>.............kgs or ..............lbs |
| **3.** | To the best of your knowledge are you having a caesarean to deliver your baby?<br>☐ No<br>☐ Don't know<br>☐ Yes |
| **4.** | Have you seen a physiotherapist since you were pregnant?<br>☐ No<br>☐ Don't know<br>☐ Yes<br>☐ Not available |

**5.** If YES to question 4 why did you see the physiotherapist?

☐ Back/pelvic pain

☐ Leaking urine

☐ Don't remember

☐ Other (specify): ............................

**6.** Did you download any pregnancy Apps?

☐ No

☐ Don't know

☐ Yes Which topic? ……………………………

**7.** It would be helpful to be given reliable websites for pregnancy-related information

☐ Strongly agree

☐ Agree

☐ Undecided

☐ Disagree

☐ Strongly disagree

**8.** Did you ask / search for information on pelvic floor muscles/exercises from (tick all that apply)? This does NOT include the education link sent to some of you.

☐ Physiotherapist

☐ Nurse/Midwife

☐ Book

☐ Internet

☐ Family/Friend

☐ Did not search

☐ Other ................................

**9.** Do you exercise now during pregnancy - this includes going for a walk?

- ☐ 30 minutes or more, 5 or more times a week
- ☐ 30 minutes or more, 1 – 4 times a week
- ☐ 10 - 20 minutes, 5 or more times a week
- ☐ 10 minutes, 1 – 4 times a week
- ☐ Never
- ☐ Other (name) .....................

**10.** Have you attended antenatal education or parent classes?

- ☐ Attending now/soon
- ☐ No
- ☐ Don't know
- ☐ Yes
- ☐ Not available

**11.** If YES to question 10 did you receive education on pelvic floor muscles/exercises at the class?

- ☐ No
- ☐ Don't know
- ☐ Yes

**12.** Did you receive the online YouTube pelvic floor education link from Judy, the University of Notre Dame researcher?

- ☐ No
- ☐ Don't know
- ☐ Yes

**13.** If NO to question 12 go to question 19.

If YES to question 12 how many times did you watch this YouTube pelvic floor education?

- ☐ Three times or more
- ☐ Twice
- ☐ Once
- ☐ Never watched

---

**14.** I would recommend this YouTube pelvic floor education to a friend

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

---

**15.** I will use this YouTube pelvic floor education in the future if (tick all that apply)

- ☐ I am pregnant again
- ☐ As a refresher for pelvic floor exercises
- ☐ I leak urine
- ☐ Other (specify) ..............................
- ☐ Don’t know

---

**16** Can you recommend any improvements to this YouTube pelvic floor education?

- ☐ More detail
- ☐ Less detail
- ☐ Just right
- ☐ Other

**17** What were the benefits of this YouTube pelvic floor education? (tick all that apply)

- ☐ Learnt HOW to do pelvic floor exercises
- ☐ Learnt WHEN to do the pelvic floor exercises, before lifting and coughing
- ☐ Convenient
- ☐ Easy to understand
- ☐ Reassured I am not missing out on education available elsewhere
- ☐ Saved travel time to class
- ☐ Other (specify) ....................................

**18** I would have done the pelvic floor exercises if this YouTube pelvic floor education had NOT been available

- ☐ No
- ☐ Don't know
- ☐ Yes

**19** What do your pelvic floor muscles do? (tick all that apply)

- ☐ A Stop leakage of urine
- ☐ B Stop leakage of faeces, pooh or stool
- ☐ C Support your back
- ☐ A and B
- ☐ None of the above
- ☐ Don’t know

**20** What do your pelvic floor muscles go round? (tick all that apply)

- ☐ A Bladder outlet
- ☐ B Vagina
- ☐ C Back passage
- ☐ A and B
- ☐ None of the above
- ☐ Don’t know

**21** Your pelvic floor muscle and lower tummy muscle should work together?

- ☐ True
- ☐ False
- ☐ Sometimes
- ☐ Don’t know

**22** Why might women leak urine when they are pregnant? Because

- ☐ A They are pregnant
- ☐ B Their bladder is too small
- ☐ C Their pelvic floor muscles do not work properly
- ☐ A, B and C
- ☐ None of the above
- ☐ Don’t know

---

**23** How often should you exercise your pelvic floor muscles?

- ☐ Daily
- ☐ 2 or more times per week
- ☐ Once a week
- ☐ Never
- ☐ Don’t know

---

**24** Do you leak urine at any time?

- ☐ Never
- ☐ Less than once a week
- ☐ More than once a week
- ☐ Daily
- ☐ Don’t know

Comments ..........................................................................................

---

**25** I think it is normal for women to leak urine (wee) during pregnancy

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

---

**26** I think there is treatment or help for women who leak urine (wee) during pregnancy

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

---

**27** I did leak urine and I did ask the following person for help (tick all that apply)

- ☐ Physiotherapist
- ☐ Nurse/Midwife
- ☐ Doctor
- ☐ Not leak urine
- ☐ Not look for help
- ☐ Other ................................

---

**28** I think pelvic floor muscle exercises are important

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

---

**29** If you did not get any information on pelvic floor exercises or you did not do pelvic floor exercises go to question 41 – last question – WELL DONE

I followed the advice to do the pelvic floor exercises and I became better at them

☐ Strongly agree

☐ Agree

☐ Undecided

☐ Disagree

☐ Strongly disagree

**30** I believe that pelvic floor exercises will prevent or reduce urinary leakage

☐ Strongly agree

☐ Agree

☐ Undecided

☐ Disagree

☐ Strongly disagree

**31** I followed the advice to do the pelvic floor exercises and I became stronger

☐ Strongly agree

☐ Agree

☐ Undecided

☐ Disagree

☐ Strongly disagree

**32** I am able to do the pelvic floor exercises when I am busy

☐ Strongly agree

☐ Agree

☐ Undecided

☐ Disagree

☐ Strongly disagree

**33** Reminding myself to do the pelvic floor exercises is easy

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**34** I am able to integrate pelvic floor exercises into daily life

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**35** I have managed to stick to my planned pelvic floor muscle exercise regime

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**36** I feel confident about doing my pelvic floor exercises whilst exercising/housework

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**37** I believe I was able to do my pelvic floor exercises prior to coughing or lifting

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**38** I used the following to REMIND me to do the exercises (tick all that apply)

- ☐ A particular activity
- ☐ Stickers in house/work
- ☐ Good memory
- ☐ Motivated
- ☐ Leakage of urine
- ☐ Undecided
- ☐ Other (specify) ..................................

**39** The following MOTIVATED me to do the exercises (tick all that apply)

- ☐ Stickers in house
- ☐ Did because I was advised
- ☐ Undecided
- ☐ Like doing exercises a
- ☐ Leakage of urine
- ☐ Other :…………..

**40** Having learnt these exercises I felt I was able to stop / reduce urinary leakage

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

**41** I would have liked some/more information on pelvic floor exercises

- ☐ Strongly agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly disagree

Please email or post your diary in reply paid envelope. Thank you very much for your participation. It is really appreciated. Enjoy your baby!

Address: Ms J Wilson, REPLY PAID 1225, FREMANTLE 6959

If you have any queries or issues you feel have not been satisfactorily addressed in this survey please contact Judy Wilson, PhD Candidate and Physiotherapist:

Email: judy.wilson1@my.nd.edu.au Ph: (08) 9443 0229 on Mon – Thurs, 0900 – 1700

Or

Supervisor: Associate Professor Anne-Marie Hill:

Email: anne-marie.hill@nd.edu.au Ph: (08) 9443 0239 Or

If you have any concerns or complaints about this research project please contact:

Research Office, The University of Notre Dame Australia

Email: research@nd.edu.au Ph: (08) 9433 0964 Or

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NEDLANDS WA 6009

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Email: SCGH.HREC@health.wa.gov.au

*Appendix H*

Post-Education Questionnaire

Hi

Now please fill out this survey to remind yourself of the important information.

(Sent and submitted using Survey Monkey).

| Number | Question |
|---|---|
| **1** | ID Code:… Or Name or email address ……………………………… |
| **2** | I will recommend this YouTube pelvic floor education to a friend/family member<br>☐ Strongly agree<br>☐ Agree<br>☐ Undecided<br>☐ Disagree<br>☐ Strongly disagree |
| **3** | How many times did you watch this YouTube pelvic floor education?<br>☐ Three times or more<br>☐ Twice<br>☐ Once |

| | | |
|---|---|---|
| **4** | I will use this Internet pelvic floor education in the future if (tick all that apply)<br>☐ I am pregnant again<br>☐ As a refresher for pelvic floor information<br>☐ As a refresher for pelvic floor exercises<br>☐ I leak urine<br>☐ Don’t know<br>☐ Other (specify) .............................. | |
| **5** | Can you recommend any improvements to this Internet pelvic floor education?<br>☐ Too long<br>☐ Too short<br>☐ Just enough talking<br>☐ Just right<br>☐ Other | |
| **6** | Did your partner/support person watch the Internet pelvic floor education session with you?<br>☐ No<br>☐ Don’t know<br>☐ Yes | |
| **7** | What do your pelvic floor muscles do? (tick all that apply)<br>☐ A Stop leakage of urine or wee<br>☐ B Stop leakage of faeces, pooh or stool<br>☐ C Support your back<br>☐ A and B<br>☐ None of the above<br>☐ Don’t know | |

| | |
|---|---|
| **8** | What do your pelvic floor muscles go round? (tick all that apply) |
| | ☐ A Bladder outlet |
| | ☐ B Vagina |
| | ☐ C Back passage |
| | ☐ A and B |
| | ☐ None of the above |
| | ☐ Don't know |
| **9** | Why might women leak urine when they are pregnant? Because |
| | ☐ A They are pregnant |
| | ☐ B Their bladder is too small |
| | ☐ C Their pelvic floor muscles do not work properly |
| | ☐ All of the above |
| | ☐ None of the above |
| | ☐ Don't know |
| **10** | I think it **is normal** for women to leak urine (wee) during pregnancy |
| | ☐ Strongly agree |
| | ☐ Agree |
| | ☐ Undecided |
| | ☐ Disagree |
| | ☐ Strongly disagree |
| **11** | Why is it important to exercise your pelvic floor muscles when you are pregnant? |
| | ☐ To keep the muscles strong |
| | ☐ To keep the muscles well co-ordinated (in good working order) |
| | ☐ Both of the above |
| | ☐ Don't know |

| | |
|---|---|
| **12** | It is important to breath normally and relax your legs and upper tummy muscles whilst doing pelvic floor exercises<br>☐ True<br>☐ False<br>☐ Don't know |
| **13** | It is important to relax your the pelvic floor muscles after each pelvic floor contraction<br>☐ True<br>☐ False<br>☐ Don't know |
| **14** | How often should you exercise your pelvic floor muscles?<br>☐ Daily<br>☐ 2 or more times per week<br>☐ Once a week<br>☐ About 30 contractions a day<br>☐ Don't know |
| **15** | I will use the following to remind me to do the pelvic floor exercises (tick all that apply):<br>☐ Whilst exercising, talking on the phone, eating or in the shower<br>☐ Every time I sit down or stand up, cough, sneeze or lift something<br>☐ Don't know<br>☐ Other<br>Comments ........................................................................................ |

| | |
|---|---|
| **16** | I feel more confident now that I will be able to do my pelvic floor exercises |
| | ☐ Strongly agree |
| | ☐ Agree |
| | ☐ Undecided |
| | ☐ Disagree |
| | ☐ Strongly disagree |
| **17** | If I leak or start to leak urine I may look for help from (tick all that apply) |
| | ☐ Doctor |
| | ☐ Nurse/Midwife |
| | ☐ Physiotherapist |
| | ☐ Friend |
| | ☐ Other ................................ |
| **18** | Thank you very much for your time. Any other comments are welcome. |
| | ........................................................................................................ |

Thank you for your participation. Enjoy your pregnancy.

If you have any queries or issues you feel have not been satisfactorily addressed in this survey please contact Judy Wilson, PhD Candidate and Physiotherapist:

Email: judy.wilson1@my.nd.edu.au Ph: (08) 9443 0229 on Mon – Thurs, 0900 – 1700

Or

Supervisor: Associate Professor Anne-Marie Hill

Email: anne-marie.hill@nd.edu.au Ph: (08) 9443 0239 Or

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NEDLANDS WA 6009

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Email: SCGH.HREC@health.wa.gov.au

*Appendix I*

Semi-Structured Interview

| P[a] Code | Interview Date: Gestation: | Theme |
|---|---|---|
| | Questions | |
| R[b] | Greeting and congratulations on being pregnant. It is an exciting time. Thank you for agreeing to take part in this research. Is this a convenient time to have a chat about the PFM video? Wait for a response from the participant. | |
| P | | |
| R | What did you think of the web-based PFM video? | |
| P | | |
| R | Did you find the information on doing a PFM contraction before moving, cough and sneeze lift helpful? | |
| P | | |
| R | Are you doing PFME? | |
| P | | |
| R | Have you looked at the “tips” sheet? | |
| P | | |
| R | Did your partner/support person watch the video? | |
| P | | |

*Appendix I*

Semi-Structured Interview (continued)

| P[a] Code | Interview Date: | Gestation: | Theme |
|---|---|---|---|
| | Questions | | |
| R | Do you have any questions? | | |
| P | | | |
| R | Answer the questions. Is there anything else you would like to add? | | |
| P | | | |
| R | Once again, thank you for taking part in this research. Enjoy your pregnancy and happy exercising. Goodbye. | | |
| Comments: | | | |

[a]Participant.

[b]Interviewer who was researcher.

*Appendix J*

Participants had a choice of completing their diary in either electronic form or print format, which included a reply paid envelope. The participant's choice of diary format was recorded on the consent form (Appendix B) by the researcher so that the researcher could remember which diary format the participant planned to complete. A print copy of the diary and envelope were given to the participant at the clinic or posted to them and upon completion, were asked to be returned to the researcher in either an electronic or print format.

*Appendix J Code Number:…*

Pelvic Floor Exercise and Urinary Incontinence Diary

**Please record: P = pelvic floor exercise**

**U = any urine leak, no matter how small** or large

1 x P = 10 pelvic floor exercises/contractions

P, P = 20 exercises

P, P, P = 30 exercises

Date:..........................

Please see example at bottom of page

| Days | **Pregnancy Wk 22** | **Week 23** | **Week 24** | **Week 25** | **Week 26** |
|---|---|---|---|---|---|
| **Monday** | | | | | |
| **Tuesday** | | | | | |
| **Wednesday** | | | | | |
| **Thursday** | | | | | |
| **Friday** | | | | | |
| **Saturday** | | | | | |
| **Sunday** | | | Keep up the | good work | |

| Days | **Pregnancy Wk 27** | **Week 28** | **Week 29** | **Week 30** | **Week 31** |
|---|---|---|---|---|---|
| **Monday** | | | | | |
| **Tuesday** | | | | | |
| **Wednesday** | | | | | |
| **Thursday** | | | | | |
| **Friday** | | | | | |
| **Saturday** | | | | | |
| **Sunday** | | Half way | | Keep going | |

| Days | **Pregnancy Wk 32** | **Week 33** | **Week 34** | **Week 35** |
|---|---|---|---|---|
| **Monday** | | | | |
| **Tuesday** | | | | |
| **Wednesday** | | | | |
| **Thursday** | | | | |
| **Friday** | | | | |
| **Saturday** | | | | |
| **Sunday** | Getting there | | | Last day! |

Date:..........................

Well done. This will provide valuable information. Now please fill in the final online survey and email this or pop into reply paid envelope. Thanks heaps!

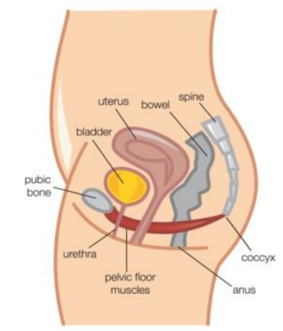
***Example:*** *Date:....20/5/13...*

| *Days* | ***Week 23*** | ***Week 24*** | ***Week 33*** | ***Week 34*** |
|---|---|---|---|---|
| ***Monday*** | *P P* | | *P P P* | *P* |
| ***Tuesday*** | | *P P P U* | *P* | *P U* |
| ***Wednesday*** | *P* | *P* | *P* | *P* |
| ***Thursday*** | | *U* | *P* | *P P U* |
| ***Friday*** | *P* | *P* | *U* | *P* |
| ***Saturday*** | *U* | | *P P* | *P* |
| ***Sunday*** | *P* | *P P* | *P* | *P* |

*Appendix K*

## Tips and Information on Pelvic Floor Muscles and Exercises

"Image courtesy of Continence Foundation of Australia"






### A. Pelvic Floor Exercises:

1. Aim to do 30 pelvic floor contractions per day in sitting, standing or lying position

2. Contract your pelvic floor before lifting, coughing or sneezing

3. Keep your upper tummy muscles, legs and bottom relaxed while breathing normally

### B. Websites with more information on pelvic floor muscles, exercises and incontinence:

Pelvic Floor First: www.pelvicfloorfirst.org.au

www.continence.org.au *The Continence Foundation of Australia*

Book (from local library) / e-book: Hold It Sister: The Confident Girl's Guide to a Leak-Free Life http://www.redsok.com/Hold%20It%20Sister (O'Dwyer, 2011)

www.bladderbowel.gov.au *has information in many languages. Click on "factsheets."*

## C. How to contact a physiotherapist:

Ring the physiotherapy department at your local hospital and ask how to make an appointment Or

Ask your local doctor or at the antenatal clinic Or

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION Member

Australian Physiotherapy Association: Ph: (08) 9389 9211

Email: wa.branch@physiotherapy.asn.au

To consult a private Physiotherapist who specialises in Continence & Women's Health it is not necessary to have a referral.

If you have any queries or issues you feel have not been satisfactorily addressed, please contact me on:

Judy Wilson, Physiotherapist: Email: judy.wilson1@my.nd.edu.au
Ph: (08) 9443 0229 Or

Supervisor: Associate Professor Anne-Marie Hill
Email: anne-marie.hill@nd.edu.au Ph: (08) 9443 0239

*Appendix L*

USB – Web-based pelvic floor muscle education video

Provided in an envelope.

*Appendix M*

Dialogue for the web-based PFM education video - Formatted in Table style

| Orator | Dialogue |
|---|---|
| PT[a] | Hi Jennifer, I'm Judy, a physiotherapist who specialises in women's health. |
| S[b] | Hi.  Yes, I am 20 weeks' pregnant and my friends suggested I come and see a physiotherapist. |
| PT | Great, it is recommended that pregnant women learn to use their PFM[c] correctly early in pregnancy.<br><br>Do you leak urine? |
| S | No. |
| PT | Have you heard of your PFM? |
| S | Sort of .........  why do we need to know about them? |

*Appendix M (continued)*

Dialogue for the web-based PFM education video

| Orator | Dialogue |
|---|---|
| PT | Because the PFM are stretched and weakened when you are pregnant. It is important to learn to use them correctly because it is easier now than after you've had your baby.<br><br>It is common for pregnant women to leak urine but it is not normal to leak urine. The reason women leak urine is because their PFM are not working properly. Research shows women who leak urine in pregnancy have more chance of leaking after delivery, during the next pregnancy and later in life.<br><br>(Show the pelvis) Your PFM go from the front of the pelvis to your coccyx or tail bone at the back. They go around the urethra or bladder outlet, vagina and back passage or anus. The PFM stop leakage of urine or wee from the front passage and faeces or stool from the back passage. They work with this lower tummy muscle or TA...and reduce back pain. It is really important to learn how to use your PFM correctly to stop leaking.<br><br>Let's sit up straight with your feet on the floor. Your PFM muscles work well with good posture. You are out having a coffee with friends. You feel like you want to pass wind. To stop passing wind, squeeze and lift around your back passage.... and let go. The let go, is as important as the contraction.<br><br>Some people hold all the time and that can cause problems.<br><br>Don't try too hard. It is a gentle squeeze and lift and let go. Make sure you are breathing normally – not holding your breath. Check that your legs, bottom and upper tummy muscles are soft. Well done. |

*Appendix M (continued)*

Dialogue for the web-based PFM education video

| Orator | Dialogue |
|---|---|
| S | How hard should I squeeze? |
| PT | Do one as hard as you can and take it down a notch – about 80% of maximum. Now we are going to work the PFM at the front. All the muscles work together but some people feel them better at the back and others at the front. Roll up your top. Put your fingers here and feel TA work at same time. (Palpate TA)<br><br>So, you are busting for a wee. Squeeze and lift around your front passage as though you are trying to stop leaking urine – 2, 3, 4, 5 (seconds). |
| S | It is really hard! I can hold for 5 seconds. |
| PT | OK so that is your "working time." |
| S | What is the average? |
| PT | Aim to work up to a 10 sec hold.<br><br>Put your hands on your upper tummy and make sure your tummy stays soft. Soooo lift and squeeze around your vagina 2 3 4 5 and let go. It should feel like you are sucking up a straw into your vagina. Again, lift and squeeze around your vagina. Fantastic, well done.<br><br>Where do you feel the PFM working strongest? |
| S | At the front. Should I always do these sitting down? |

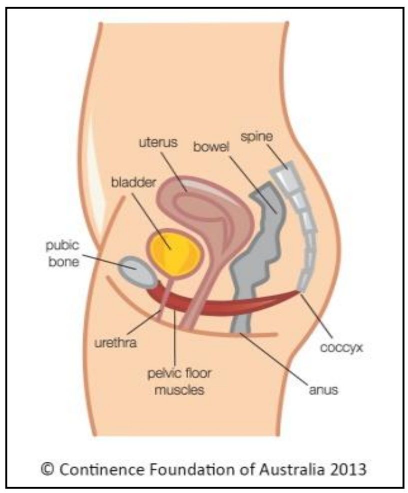
*Appendix M (continued)*

Dialogue for the web-based PFM education video

| Orator | Dialogue |
|---|---|
| PT | You can do your exercises lying on your side, easiest position, as well as sitting and standing. It is a good idea to do them as part of your daily routine. |
| S | What do you mean? |
| PT | A really good idea to link your exercises to talking on the phone or standing in the shower or out walking. In order to stop leaking urine the research recommends contracting your pelvic floor muscles prior to coughing, laughing and lifting the shopping or washing. This makes it easier to fit the exercises into your day.<br>Some people stick dots or post-it notes around the house to remind them. Choose something that suits you. |
| S | How often should I do my PFME? |
| PT | It is recommended to do 10 contractions, 3 times a day if you can manage that. If not do 5 PFM contractions 6 times a day. Try to hold for at least 5 seconds and build up to 10 seconds as able. |
| S | How can I check if my PFM are working? |
| PT | When you get home, put your fingers just inside your vagina, then lift and squeeze and feel them contract around your finger. Do you feel confident about using your PFM? |
| S | Definitely, I can feel them really well around all 3 passages and I will do them when out for my walk and prior to lifting. |

Dialogue for the web-based PFM education video - Formatted in Table style

| Orator | Dialogue |
|---|---|
| PT | Enjoy your baby! |
| PT | Remind the participant:<br>to complete the online quiz at survey monkey – URL[d];<br>about link to “Tips” sheet – for information on seeking help or further reading.<br>to fill in their diary. |
| | Acknowledgements: |


“Image courtesy of Continence Foundation of Australia”

Pelvic Floor First: [www.pelvicfloorfirst.org.au](http://www.pelvicfloorfirst.org.au)

pelvic floor first
www.pelvicfloorfirst.org.au

Dialogue for the web-based PFM education video

If you have any queries or issues you feel have not been satisfactorily addressed in this education please contact, Judy Wilson, PhD Candidate and Physiotherapist

Email: judy.wilson1@my.nd.edu.au

Tel: (08) 9443 0229 on Mon – Thurs, 0900 – 1700

Or

***Supervisor:***

Associate Professor Anne-Marie Hill

Email: anne-marie.hill@nd.edu.au

Ph: (08) 9443 0239

Or

If you have any concerns or complaint about this research project please contact:

Research Office, The University of Notre Dame Australia

Email: research@nd.edu.au or Ph: (08) 9433 0964 Or

The contact details of the local HREC were included.

*Note*. URL = User Resource Link.

[a]Physiotherapist.

[b]Pregnant woman.

[c]Verbalised as pelvic floor muscles.

*Appendix N*

Supplementary tables and figures discussed in Chapters 5 and 6

***Self-Reported Smoking Habits During Pregnancy.*** *Chapter 5 (Section 5.21)*

Results from Table 1 demonstrate that 52 (45.2%) of respondents who are self-reported smokers stopped smoking during pregnancy. This was new information in WA although the DOHWA had started to collect data on women who decreased or stopped smoking during pregnancy and such data are now available. The proportion of women (Hutchinson & Joyce, 2014) not smoking increased by 1.5% (470 women) from zero to after 20 weeks' gestation which is lower than 8.2% (52 women) reported by respondents. Respondents were not asked at what stage of pregnancy they stopped smoking as research studies have found that 20% to 40% of pregnant smokers stopped smoking early in pregnancy (Cnattingius, 2004) although interventions designed to stop smoking during pregnancy have had limited success (Lumley et al., 2009).

Table 1.

*Self-Reported Smoking Habits During Pregnancy, Chapter 5 (Section 5.21)*

| Self-reported smoking habits during pregnancy n(%) | Respondents (n = 633) | DOHWA (n = 30,843) |
|---|---|---|
| Not smoking | 496 (78.4) | |
| Stopped during pregnancy | 52 (8.2) | |
| Total: not smoking | 548 (86.6) | 27,115 (87.9) |
| Smoking | 63 (10.0) | 3,728 (12.1) |
| Missing | 22 (3.4) | |

Table 2.

*Frequency of Self-Reported Urinary Incontinence Compared to Gestation, Chapter 5 (Figure 5.2)*

| | Gestation in weeks (n = 607) | | |
|---|---|---|---|
| Self-reported urinary incontinence n(%) | 0 – 20 (n = 110) | 21 – 30 (n = 203) | 31 – 41 (n = 294) |
| Never | 64(58.2) | 103(50.7) | 123(41.8) |
| <1/week | 27(24.5) | 52(25.6) | 91(31.0) |
| >1/week | 13(11.8) | 28(13.8) | 41(13.9) |
| Daily | 3(11.8) | 14(6.9) | 35(11.9) |
| Don't know | 3(2.7) | 6(3.0) | 4(1.4) |

Table 3.

*Prevalence of Self-Reported Urinary Incontinence Compared to Parity, Chapter 5 (Figure 5.3)*

| | Parity (n = 622) | | |
|---|---|---|---|
| Self-reported urinary incontinence n(%) | 0 (n = 317) | 1 (n = 180) | 2+ (n = 125) |
| Never | 177(55.8) | 66(36.7) | 48(38.4) |
| <1/week | 77(24.3) | 56(31.1) | 41(32.8) |
| >1/week | 29(9.1) | 31(17.2) | 22(17.6) |
| Daily | 19(6.0) | 21(11.7) | 12(9.6) |
| Don't know | 8(2.5) | 3(1.7) | 2(1.6) |
| Missing | 7(2.2) | 3(1.7) | |

Table 4.

*Prevalence of Self-Reported General Exercise Compared to Gestation, Chapter 5, (Section 5.25, Figure 1 below)*

| | Gestation in weeks (n = 601) | | |
|---|---|---|---|
| Frequency of exercise n(%) | 0 – 20 (n = 109) | 21 – 30 (n = 200) | 31 – 41 (n = 292) |
| 30 minutes x 5/week | 30(27.5) | 35(17.5) | 59(20.2) |
| 30 minutes x 1 – 4/week | 31(28.4) | 69(34.5) | 75(25.7) |
| 10 – 20 minutes x 5/week | 19(17.4) | 28(14.0) | 51(17.5) |
| 10 minutes x 1- 4/week | 17(15.6) | 33(16.5) | 56(19.2) |
| Never | 8(7.3) | 30(15.0) | 41(14.0) |
| Other | 4(3.7) | 5(2.5) | 10(3.4) |

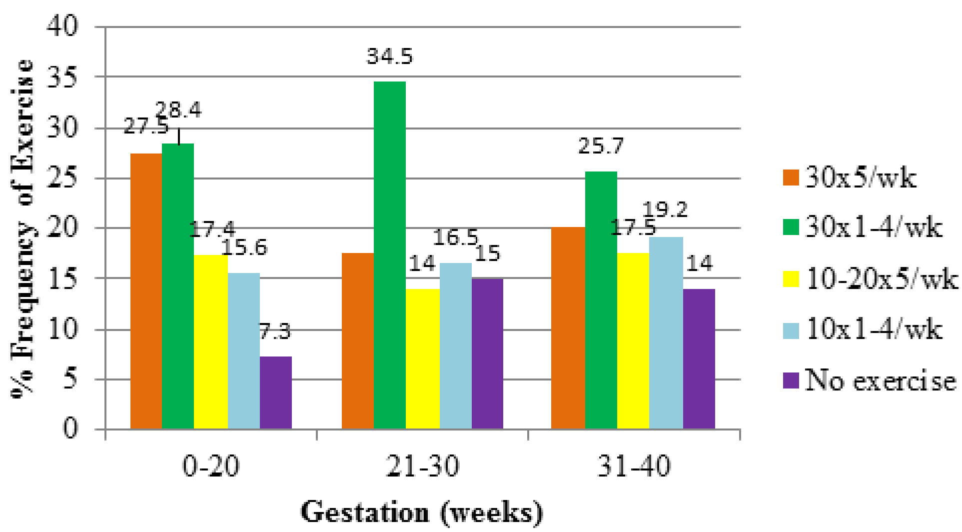



Figure 1. Comparison of gestation to frequency of general exercise.

Table 5.

*Respondents' Frequency of Self-Reported General Exercise Compared to Parity, Chapter 5 (Section 5.25, Figure 2 below)*

| | Parity (n = 586) | | |
|---|---|---|---|
| Frequency of general exercise n(%) | 0 (n = 304) | 1 (n = 176) | 2+ (n = 106) |
| 30 minutes x 5/week | 69(22.7) | 31(17.6) | 25(23.6) |
| 30 minutes x 1 – 4/week | 96(31.6) | 44(25.0) | 19(17.9) |
| 10 – 20 minutes x 5/week | 53(17.4) | 25(14.3) | 19(17.9) |
| 10 minutes x 1- 4/week | 45(14.8) | 40(22.7) | 21(19.8) |
| Never | 35(11.5) | 31(17.6) | 13(12.3) |
| Other | 6(2.0) | 5(2.8) | 9(8.5) |

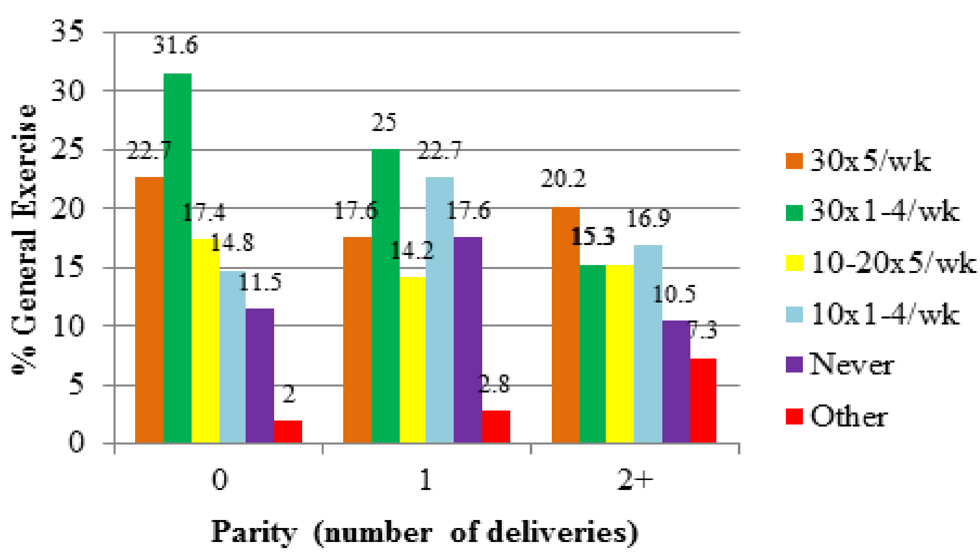



Figure 2. Comparison of parity to frequency of general exercise.

Table 6.

*Respondents' Internet Usage, Parity and Language Spoken at Home, Chapter 5 (Section 5.26)*

| | Parity 0 | |
|---|---|---|
| | Language spoken at home | |
| | LOTE | English |
| Internet use for pregnancy-related information n(%) | (n = 60) | (n = 256) |
| Yes | 50 (83.3) | 227 (88.7) |
| No | 9 (15.0) | 17 (6.6) |
| Missing | 1 (1.7) | 10 (3.9) |
| Topics searched on Internet during pregnancy[a] n(%) | | |
| Pelvic floor muscles | 9 (15.0) | 42 (16.4) |
| Safe exercises during pregnancy | 29 (48.3) | 107 (41.8) |
| Back pain | 25 (41.7) | 91 (35.5) |
| Bladder | 8 (13.3) | 20 (7.8) |
| Bowel | 11 (18.3) | 46 (18.0) |
| Care of baby | 36 (60.0) | 137 (53.5) |
| Labour | 32 (53.3) | 156 (60.9) |
| Other topics | 15 (25.0) | 59 (23.0) |
| Missing | 1 (1.7) | 12 (4.7) |
| Included in other topics[a] n(%) | (n = 15) | (n = 59) |
| Stages of pregnancy | 15 (100.0) | 38 (64.4) |
| Health related to baby | | 17 (28.8) |
| Health related to pregnant woman | 2 (13.3) | 6 (10.2) |
| Missing | 1 (6.7) | 16 (27.1) |
| Willing to use the Internet for ANE n(%) | | |
| Yes | 41 (68.3) | 146 (57.0) |
| No | 9 (15.0) | 50 (19.5) |
| Don't know | 10 (16.7) | 56 (21.9) |

[a]More than one answer.

Table 7.

*Age, Level of Education, Country of Birth and Language Spoken by Participants Interviewed Chapter 6, (Section 6.32).*

| Characteristic | Response (n = 35) |
|---|---|
| Interviewed | |
| Yes | 24 (68.6) |
| No | 10 (28.6) |
| Withdrew | 1 (2.8) |
| | (n = 24) |
| Age (years), mean ±SD | 29.92 ±4.04 |
| Age (years), median | 29.50 |
| Level of Education completed n(%) | |
| University | 17 (70.9) |
| TAFE | 5 (20.8) |
| Year 12 | 2 (8.3) |
| Country of Birth n(%) | |
| Australia & New Zealand | 13 (54.2) |
| Asia | 6 (25.0) |
| Other Europe, South & Central America & Pacific (LOTE) | 2 (8.3) |
| South Africa, Zimbabwe, North America (English) | 3 (12.5) |
| English Spoken at Home n(%) | |
| No | 7 (29.2) |

*Note.* No response to interview includes participants who hung up when contacted; did not answer the phone; had not watched the web-based PFM education programme; telephone number incorrect; and information technology issues such as no credit for purchasing telephone or Internet connection or no Internet signal.

Table 8.

*Demographic Characteristics of Participants who Completed the Research, Chapter 6, (Section 6.32).*

| Characteristic | Total (n = 47) | Control (n = 22) | Intervention (n = 25) |
|---|---|---|---|
| Age (years), mean ±SD | 29.5 ±5.0 | 29.2 ±6.2 | 29.7 ±3.9 |
| Age (years), median | 29.0 | 28.5 | 29.0 |
| Marital status n(%) | | | |
| Married/De facto | 47(100) | 22 (100.0) | 25 (100.0) |
| Education level completed n(%) | | | |
| University | 24 (51.0) | 8 (36.4) | 16 (64.0) |
| TAFE | 14 (29.8) | 8 (36.4) | 6 (24.0) |
| Year 12 | 8 (17.0) | 5 (22.7) | 3 (12.0) |
| Year 10 | 1 (2.1) | 1 (4.5) | |
| SEIFA quintiles n(%) | | | |
| 1(low SES) | 1 (2.1) | 1 (4.5) | |
| 2 | 2 (4.3) | 2 (9.1) | |
| 3 | 13 (27.7) | 7 (31.8) | 6 (24.0) |
| 4 | 9 (19.1) | 4 (18.2) | 5 (20.0) |
| 5 (high SES) | 22 (46.8) | 8 (36.4) | 14 (56.0) |
| Receipt of government assistance[a] n(%) | | | |
| No | 44 (93.6) | 21 (95.5) | 23 (92.0) |
| Yes | 3 (6.4) | 1 (4.5) | 2 (8.0) |
| Aboriginal n(%) | | | |
| Yes | 1 (2.1) | | 1 (4.0) |
| Missing | 1 (2.1) | 1 (4.5) | |

Table 8. (continued)

*Demographic Characteristics of Participants who Completed the Research, Chapter 6, (Section 6.32).*

| Characteristic | Total (n = 47) | Control (n = 22) | Intervention (n = 25) |
|---|---|---|---|
| Country of birth n(%) | | | |
| Australia & New Zealand | 26 (55.3) | 13 (59.1) | 13 (52.0) |
| United Kingdom & Ireland | 5 (10.6) | 64 (18.2) | 1 (4.0) |
| Asia | 9 (19.1) | 3 (13.6) | 6 (24.0) |
| Other Europe, South & Central America & Pacific (inhabitants speak LOTE) | 4 (8.5) | 2 (9.1) | 2 (8.0) |
| South Africa, Zimbabwe, North America (inhabitants speak English) | 3 (6.4) | | 3 (12.0) |
| Language spoken at home n(%) | | | |
| Languages other than English | 11 (23.4) | 4 (18.2) | 7 (28.0) |
| English | 36 (76.6) | 18 (81.8) | 18 (72.0) |
| Planned site of delivery n(%) | | | |
| Metropolitan | 45 (95.6) | 21 (95.5) | 24 (96.0) |
| Country | 2 (4.4) | 1 (4.5) | 1 (4.0) |

[a]Payments due to ill health, low income or unemployment.

Table 9.

*Interview, Diary, Medical Conditions and General Exercise Responses of Participants who Completed the Research, Chapter 6 (Section 6.33)*

| Characteristic | Completers (n = 47) | Control (n=22) | Intervention (n = 25) |
|---|---|---|---|
| Participated in interview | | | |
| Yes | | NA | 23 (92.0) |
| No | | NA | 2 (8.0) |
| Completed diary | | | |
| Yes | 34 (72.3) | 12 (54.5) | 22 (88.0) |
| No | 13 (27.7) | 10 ( 45.5) | 3 (12.0) |
| Doing PFME at follow-up | | | |
| Yes | 34 (72.3) | 10 (45.5) | 24 (96.0) |
| No | 12 (27.7) | 12 (54.5) | 1 (4.0) |
| Doing PFME at baseline | | | |
| Yes | 7 (14.9) | 4(18.2) | 3 (12.0) |
| No | 40 (85.1) | 18 (81.8) | 22 (88.0) |
| Planning to have a LUSCS | | | |
| Yes | 3 (6.4) | 1 (4.5) | 2 (8.0) |
| No | 34 (72.3) | 16 (72.7) | 18 (72.0) |
| DK | 10 (21.3) | 5 (22.7) | 5 (20.0) |
| BMI at follow-up[a] n(%) | | | |
| BMI, median (IQR) | | 35.8 (8.0) | 33.7 (7.3) |
| Normal (< 25.0) | 35 (74.5) | 19 (86.4) | 16 (64.0) |
| Overweight (25.0 to 29.9) | 8 (17.0) | 1 (4.5) | 7 (28.0) |
| Obese (> 29.9) | 4 (8.5) | 2 (9.1) | 2 (8.0) |

Table 9. (continued)

*Interview, Diary, Medical Conditions and General Exercise Responses of Participants who Completed the Research, Chapter 6 (Section 6.33)*

| Characteristic | Completers (n = 47) | Control (n=22) | Intervention (n = 25) |
|---|---|---|---|
| Medical conditions relating to pelvic floor muscle function at baseline[c] n(%) | | | |
| No medical condition | 36 (76.6) | 17 (77.3) | 19 (76.0) |
| Asthma/cough | 4 (8.5) | 1 (4.5) | 3 (12.0) |
| IBS | 1 (2.1) | 1 (4.5) | |
| Constipation | 2 (4.2) | 1 (4.5) | |
| Other | 3 (6.4) | 1 (4.5) | 2 (8.0) |
| Missing | 2 (4.3) | 1 (4.5) | 1 (4.0) |
| Self-reported urinary incontinence n(%) | | | |
| Never | 17(36.2) | 10(45.5) | 7(28.0) |
| <1/week | 17(36.2) | 5(22.7) | 12(48.0) |
| >1/week | 7(14.9) | 2(9.1) | 5(20.0) |
| Daily | 4(8.5) | 3(13.6) | 1(4.0) |
| Don't know | 2(4.3) | 2(9.1) | |
| Frequency of self-reported general exercise/week at baseline n(%) | | | |
| 30 minutes x 5 | 16(34.0) | 8(36.4) | 8 (32.0) |
| 30 minutes x 1 – 4 | 17(36.2) | 7(31.8) | 10 (40.0) |
| 10 – 20 minutes x 5 | 8(17.0) | 4(18.2) | 4 (16.0) |
| 10 minutes x 1- 4 | 4(8.5) | 2(9.1) | 2 (8.0) |
| Never | 2(4.3) | 1(4.5) | 1 (4.0) |

Table 9. (continued)

*Interview, Diary, Medical Conditions and General Exercise Responses of Participants who Completed the Research, Chapter 6 (Section 6.33)*

| Characteristic | Completers (n = 47) | Control (n=22) | Intervention (n = 25) |
|---|---|---|---|
| Self-reported smoking habits during pregnancy at baseline n(%) | | | |
| No | 45 (95.7) | 20 (90.9) | 25 (100.0) |
| Stopped during pregnancy | 2 (4.3) | 2 (9.1) | |
| Total: Not Smoked | 47 (100) | 22 (100) | 25 (100.0) |

*Note*. NA = Not Applicable.

[a]BMI was calculated as weight prior to becoming pregnant divided by height squared; height and weight were measured at antenatal clinics.

[b]Data are missing because because respondents' heights were not measured.

[c]More than one answer.

Table. 10.

*Levels of Knowledge About Pelvic Floor Muscles - Immediately Post-Education, Chapter 6 (Section 6.42, Figure 6.5)*

| Characteristic - Post-Pelvic Floor Muscle Education Questionnaire | Intervention (n = 35) |
|---|---|
| Why is it important to do PFME when pregnant?[a] n(%) | |
| Keep PFM strong[b] | 3 (8.6) |
| Keep PFM well co-ordinated[b] | 1 (2.9) |
| Both of the above[c] | 23 (65.7) |
| Not Applicable | 1 (2.9) |
| Missing | 7 (20.0) |
| It is important to breath and relax your legs and upper tummy n(%) | |
| Yes[c] | 27 (77.1) |
| Not Applicable | 1 (2.9) |
| Missing | 7 (20.0) |
| It is important to relax PFM after each PFM contraction n(%) | |
| Yes[c] | 27 (77.1) |
| Not Applicable | 1 (2.9) |
| Missing | 7 (20.0) |

[a] More than one answer.

[b] Answer partially correct.

[c] Answer correct.

Table 11.

*Self-Reported Engagement in Pelvic Floor Muscle Exercises Compared Between the Intervention and the Control group, Chapter 6 (Section 6.44)*

| Characteristic | Odds ratio | *p*-value (n = 34) | 95% Wald confidence interval | |
|---|---|---|---|---|
| | | | Lower | Upper |
| Model 3 | | | | |
| Control | 1 | | | |
| Intervention | 2.693 | 0.026 [a] | 0.325 | 5.061 |
| Frequency UI | 1.245 | 0.284 | -1.033 | 3.523 |
| Model 4 | | | | |
| Control | 1 | | | |
| Intervention | 2.966 | 0.016[a] | 0.559 | 5.373 |
| Speak LOTE | 0.366 | 0.729 | -1.703 | 2.436 |
| Model 5 | | | | |
| Control | 1 | | | |
| Intervention | 2.826 | 0.019 [a] | 0.461 | 5.190 |
| SEIFA | 1.022 | 0.310 | -0.952 | 2.995 |
| Model 6 | | | | |
| Control | 1 | | | |
| Intervention | 2.658 | 0.039[a] | 0.140 | 5.175 |
| BMI | 0.169 | 0.897 | -2.377 | 2.715 |
| Model 7 | | | | |
| Control | 1 | | | |
| Intervention | 3.081 | 0.006 [a] | 0.903 | 5.258 |
| Education | 1.165 | 0.276 | -0.933 | 3.264 |

[a]Comparison between the intervention and control group adjusting for predictive factors of UI, LOTE, SEIFA, BMI and education.

Table 12.

*Attendance at Antenatal Education and Consultation with Physiotherapists by Participants who Completed the Research, Chapter 6 (Section 6.50)*

| | Baseline | | Follow-up | |
|---|---|---|---|---|
| Characteristic | Control (n = 22) | Intervention (n = 25) | Control (n = 22) | Intervention (n = 25) |
| Attendance at ANE n(%) | | | | |
| Not planned to attend | 1 (4.5) | 3 (12.0) | | |
| Not attended | | | 5 (22.7) | 2 (8.0) |
| Planned to attend | 20 (90.9) | 21 (84.0) | | |
| Attended this pregnancy | 1 (4.5) | 1 (4.0) | 17 (77.3) | 23 (92.0) |
| Education on PFM/E at ANE | | | (n = 17) | (n = 23) |
| Yes | | | 5 (29.4) | 10 (43.5) |
| No | | | 8 (47.0) | 10 (43.5) |
| DK | | | 1 (6.0) | 2 (8.7) |
| Missing | | | 3 (17.6) | 1 (4.3) |
| Consulted a physiotherapist | | | | |
| Yes | 2 (9.1) | 4 (16.0) | 4 (18.2) | 5 (20.0) |
| No | 20 (90.9) | 21 (84.0) | 18 (81.8) | 20 (80.0) |

*Appendix O*

Email to participants in pilot randomised controlled trial at 35 weeks' (+/- 1) gestation

Dear                         Code number:

I hope your pregnancy is going well? It is fantastic that you have participated in this important and beneficial research. The last hurdle is to NOW:

Please fill in this final survey – I have made it as short as possible

https://www.surveymonkey.com/s/X5C2C96

Finish your diary (online) and email or scan it to me or post to:

Ms J Wilson

School of Physiotherapy

REPLY PAID 1225

FREMANTLE WA 6959

Happy Delivery    Any questions?    Please contact us.


| | |
|---|---|
| Judy Wilson, Ph D Candidate | Associate Professor Anne-Marie Hill |
| Women's Health Physiotherapist | Principal Supervisor |
| judy.wilson1@my.nd.edu.au | anne-marie.hill@nd.edu.au |
| Ph: 0409 666 811 | Ph: 9443 0239 |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