

**Towards a Comprehensive Understanding of Women's Physical
Activity Behaviour during Pregnancy and Postpartum:
Implications for Intervention Design**

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Abstract

Women going through the major life transition of pregnancy and early motherhood may experience significant physical, psychological, social and lifestyle changes, including a decrease in physical activity behaviour, which potentially compromises maternal, infant and family health and wellbeing. Current evidence does not seem to provide a comprehensive understanding of the determinants of women's physical activity behaviour during pregnancy and postpartum and no longitudinal study during this transition phase has been published to date. This PhD therefore explored: life and physical activity changes; individual, social environmental, and physical environmental determinants of physical activity behaviour; and how women give meaning to their physical activity experiences during pregnancy and the postnatal period, including how these meanings relate to or are shaped by dominant ideology around physical activity, pregnancy and motherhood. The findings of this exploration were used to develop intervention suggestions that may improve future intervention design in order to increase physical activity in this particular population.

This research project consisted of: 1) a literature review on the determinants of physical activity, 2) an intervention review, and 3) a longitudinal study. The longitudinal study involved four intervals (1st, 2nd, 3rd trimester, and 3 months postpartum) and was subjected to a dual qualitative analysis: socio-ecological and feminist.

The results of the literature review on the determinants of physical activity, the intervention review, and the longitudinal study informed the final determinant analysis including individual, social environmental and physical environmental determinants of antenatal and postpartum physical activity. The following individual level determinants appeared to be most important in explaining women's physical activity behaviour during pregnancy and motherhood: behavioural beliefs; knowledge; motivation; self-efficacy; priority; and sickness, tiredness and physical discomforts. The most important determinants in the social environment included: emotional and instrumental support from formal and informal sources, informational support from health professionals; companionship from partner, family and/or friends; social norms related to public breastfeeding; and gender inequality in terms of physical activity social norms, stigma

attached to pregnancy, gender role expectations and social role strain. The most important determinants in the physical environment included: aesthetics, neighbourhood walkability, traffic safety and weather conditions. The individual and social environmental determinants appeared more important than physical environmental determinants in relation to physical activity behaviour during pregnancy and postpartum.

Physical activity had multiple meanings for women in this study. These meanings were commonly expressed as tensions. Five key tensions have been identified: 1) Desiring physical activity, keeping the baby safe and social approval, 2) Being a 'good' mother and engaging in self-care, 3) role fulfilment and physical activity, 4) Struggling and negotiating new identities, and 5) The wish to privately breastfeed yet not be housebound.

This dissertation ends with intervention suggestions based on the findings of the literature reviews and longitudinal study. The implications for future intervention design address the importance of including the views and lived experiences of pregnant and postnatal women in the development of future interventions. Interventions that reflect an understanding of the social structures that shape women's experiences have the potential to increase women's agency to exert more control over their physical activity choices. Women's views and experiences also have the potential to complement and enrich understanding of women's physical activity behaviour by health promotion professionals and physical activity advocates. With this understanding, health experts may be better positioned to work together with women towards change. Intervention suggestions include informational support to increase knowledge among pregnant women and mothers about the benefits of physical activity for personal and family wellbeing. This research project developed guidelines that can be used by media, health care providers, fitness professionals and other allied health professionals to inform pregnant and postnatal women and the general public. Other intervention suggestions include reducing the stigmatisation of pregnancy, promoting supportive social norms around physical activity during and after pregnancy, and promoting public breastfeeding. Future intervention strategies may also be more effective if these would assist women in finding a healthy balance between self-care and care for others during motherhood, and would focus on increasing partner support during pregnancy and motherhood. Finally, future strategies may be more effective in increasing women's physical activity behaviour if

these would stimulate inter-women communication during pregnancy and motherhood; provide local and low cost exercise groups or ensure companionship; and improve aesthetics, walkability and traffic safety.

In order to sustainably promote physical activity among pregnant and postnatal women, it is important to acknowledge women as active agents of change and to build on existing partnerships, and establish new collaborations with: local, federal and state governments; non-government and commercial organisations; and divisions within and outside of the health care sector. Non-government organisations such as the National Heart Foundation of Australia and researchers may play an important role in leading a physical activity advocacy initiative.

Declaration of Originality

I certify that the research presented in this thesis is original, except where explicit reference is made in the text. I also declare that the material in this thesis has not been submitted, either in whole or in part, for any other academic award at this university or at any other university or institution.

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Michelle van Mulken

1st Sep 2013

Dedications

This thesis is dedicated to my parents, who always believed in me, even when I didn't, and for all the support in terms of love, encouragement and financial support you gave me. I could not have wished for better parents. Thank you Mum for always being there when I needed to talk or vent. Thank you dad for making sure we were involved in sports as kids and teenagers. You taught me the importance of physical activity for physical health, for a sense of personal achievement, for enjoyment, and for building long lasting friendships. You taught me my first lessons about perseverance via running.....I can still remember that day when I outran you for the first time after 2 years training of track and off-road training.....it's kind of how I feel now, you know you've achieved something that means a lot to you, yet you know it's only the beginning.

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Glossary

Aesthetics - Subjective environmental aesthetics can be defined as the appreciation of the physical environment.¹ Objectively measured aesthetic characteristics in the neighbourhood include levels of cleanliness, variety of sights, and variety of building designs.²

Agency - an individual's or group's level of freedom to do and achieve in pursuit of whatever goals or values are regarded as important.³

Attitude - The combination of physical activity beliefs and judgments about the value of each expected outcome of physical activity.⁴

Barrier self-efficacy - The confidence a person has in overcoming barriers.^{5, 6}

Behavioural beliefs - An individual's beliefs about consequences of a certain behaviour.⁴

Body image - The psychological experience of one's own body.⁷

Determinant analysis - The analysis of the factors that contribute to the expression of a health problem.⁸

Double consciousness - being tuned in to the dominant worldviews of society and own minority perspectives.⁹

Empowerment - Increasing people's freedom of choice and action to shape their own lives¹⁰. It is the process of enhancing an individual's or group's capacity to make choices and to transform those choices into desired actions and outcomes.¹¹

Environmental reevaluation combines both affective and cognitive assessments of how the presence or absence of a personal habit affects one's social environment and the awareness that one can serve as a positive or negative role model for others.¹²

Episodes of psychological decompensation - exacerbations or temporary increases in symptoms or signs accompanied by a loss of adaptive functioning as manifested by difficulties in performing activities of daily living, maintaining social relationships, or maintaining concentration, persistence, or pace.¹³

Epistemology - “the study of the nature of knowledge and justification”.¹⁴

Exercise - a subset of physical activity that is planned, structured and repetitive, and aims to improve or maintain physical fitness.¹⁵

Feminist standpoint epistemology - it places women at the centre of the research process; women’s everyday life experiences provide the starting point from which to build knowledge¹⁶.

Gender role expectations - The set of social and behavioural norms that are considered socially appropriate for individuals of a specific sex in the context of a specific culture, and which differ widely between cultures and historical periods.¹⁷

Ideology - patterns of beliefs, ideas, opinions, and values that are used to create meaning.¹⁸

Intention - The cognitive representation of a person’s readiness to perform a given behaviour.⁴

Interpersonal relationships - The combination of the social structure (i.e., social networks) of an individual’s social life (e.g., existence of ties with family and friends) and the more explicit functions they may serve (i.e., social support).¹⁹

Maternal self-efficacy - feelings of maternal competence, familiarity with the maternal role, and problem-solving skills.²⁰

Motivation - the desire that energises and directs goal-oriented behaviour.²¹

Physical activity - any bodily movement produced by skeletal muscles that results in energy expenditure.¹⁵

Physical activity self-efficacy - the confidence a person has in engaging in regular physical activity.⁶

Physical activity self-regulatory efficacy - the confidence an individual has in generating thoughts, feelings and actions that are oriented towards increasing levels of physical activity.²²

Physical disorder - the number of abandoned buildings or vacant lots, and the presence of trash and graffiti, broken windows or abandoned cars on the street segment.²³

Researcher reflexivity - acknowledgement of the researcher's contribution to meaning constructions throughout the research process by: regularly reflecting upon the ways in which personal values, experiences, interests, beliefs, political commitments, wider aims in life and social identities shape the research.^{24, 25}

Self-efficacy - the confidence an individual has in performing certain behaviours.⁵

Self-esteem - the experience of being competent to cope with the basic challenges of life and being worthy of happiness and the sum of self-confidence and self-respect.²⁶

Social norms - the customary rules that govern behaviour in groups and societies.²⁷

Self-regulation - self generated thoughts, feelings, and actions, which are systematically oriented towards attainment of goals.²²

Self-worth - a sense of self-respect and personal worth.²⁶

Social capital - the interpersonal trust between citizens, norms of reciprocity, sense of community, and social participation and group membership that facilitates collective action and cooperation for mutual benefit.²⁸ Social capital can be viewed as a measure of the strength of social cohesion.²⁸

Social cohesion - the extent of connectedness and solidarity among groups in society.²⁹

Social discrimination - any form of prejudice or stigma based on physical traits such as race, weight and age.³⁰

Social environment - the shaping norms that enforce patterns of social control, provide or not provide environmental opportunities to engage in particular behaviours, reduce or produce stress, and place constraints on individual choice.³¹

Social inequality - this exists when people frequently receive more of a society's 'valuable goods' than others owing to their position in the social network and can be viewed as an unequal distribution of power, privilege, and prestige.^{32, 33}

Social network - the collective structure of social relationships that surround an individual and provide information on how an individual is integrated with others.³⁴

Social Norm - Social norms refer to the customary rules that govern behaviour in groups and societies.²⁷

Social support - support which is provided by other people and arises within the context of interpersonal relationships and is accessible to an individual through social ties to other individuals, groups, and the larger community.^{35, 36} There are four common function of social support:

- **Emotional support** is the offering of empathy, concern, affection, love, trust, acceptance, intimacy, encouragement, or caring,³⁷
- **Instrumental or Tangible support** is the provision of financial assistance, material goods, or services,³⁷
- **Informational support** is the provision of advice, guidance, suggestions, or useful information to someone,³⁷ and
- **Belonging support** is the type of support that gives someone a sense of social belonging through companionship of others in social activities.³⁷

Social role strain - the felt difficulty in fulfilling role obligations.³⁸

Socially situatedness of knowledge - knowledge is located in particular places, in particular times; people have different standpoints, live in different social realities, and embody different knowledges depending on socio-economic, cultural and racial backgrounds.^{16, 39}

Standpoint - a "position" in society that is affected by and, in turn, can help shape structures of power, work, and wealth.⁴⁰

Stigma - the process by which the reaction of others spoils normal identity.⁴¹

Strong Objectivity - Those who are disadvantaged are in a position provide a less distorted and more reliable understanding of social reality.⁴²⁻⁴⁴

The built environment - the combination of urban design, land use, and the transportation system, and encompasses patterns of human activity within the physical environment.⁴⁵

Walkable and cyclable environment - neighbourhoods that have high path availability, accessibility and connectivity and are within walking or cycling distance from destinations.

List of Acronyms

ACOG - American College of Obstetricians and Gynecologists

CCM - Constant Comparative Method

CSEP - The Canadian Society for Exercise Physiology

RPE - Ratings of Perceived Exertion

SMA - Sports Medicine Australia

SOGC - Society of Obstetricians and Gynaecologists of Canada

TTM - Transtheoretical Model

UPNC - Universal Postnatal Contact Initiative

USC - University of the Sunshine Coast

Chapter 1. Introduction

Women going through the major life transition of pregnancy and early motherhood may experience significant physical, psychological, social and lifestyle changes⁴⁶, including a decrease in physical activity behaviour,⁴⁷⁻⁴⁹ which could potentially compromise maternal, infant and family health and wellbeing.^{50, 51} This PhD investigated: life and physical activity changes; the determinants of physical activity behaviour; and how women give meaning to their physical activity experiences in their daily lives throughout pregnancy and early postpartum, including how these are shaped by dominant ideology around physical activity, pregnancy and motherhood, in order to inform implications for intervention design.

This chapter describes the context for this PhD, including definitions of physical activity, a discussion of the importance of physical activity in health promotion, background information regarding physical activity guidelines during and after pregnancy. This chapter also provides an outline of the research objectives and questions, the justification of the study and concludes with an overview of the thesis.

1.1 Physical Activity and Exercise Defined

The World Health Organisation defines physical activity as “any bodily movement produced by skeletal muscles that results in energy expenditure”.¹⁵ The term physical activity should not be mistaken for the term exercise. Exercise is defined as “a subset of physical activity that is planned, structured and repetitive, and aims to improve or maintain physical fitness”.¹⁵ Both terms are correctly used throughout this thesis.

1.2 Physical Activity, Health and the Economy

Levels of physical inactivity are rising in many countries, which have major implications for the general health of people worldwide; increase in the prevalence of cardiovascular disease, diabetes and cancer, and an increase in related risk factors such as raised blood pressure, raised blood sugar and overweight.⁵² Physical inactivity is estimated as being

the principal cause for approximately 21–25% of breast and colon cancer burden, 27% of diabetes and approximately 30% of ischemic heart disease burden.⁵²

Regular and adequate levels of physical activity in adults have been found to reduce the risk of hypertension, coronary heart disease, stroke, diabetes, breast and colon cancer, depression and the risk of falls; improve bone and functional health; and has been identified as a key determinant of energy expenditure, and is thus fundamental to weight control.⁵³

Of equal concern is the impact of physical activity on the Australian economy. The cost of physical inactivity in the general population is estimated to be \$13.8 billion, of which \$719 million is attributable to healthcare costs and \$9.3 billion to loss of productivity.⁵⁴ Sufficient physical activity can therefore not only improve physical and mental health in Australian antenatal and postnatal women, but can also benefit the Australian economy.

1.3 The Importance of Appropriate Physical Activity during Pregnancy and Postpartum

Insufficient physical activity for health benefits may encumber maternal and foetal health. Health risks associated with inadequate physical activity during pregnancy include gestational diabetes, hypertension and preeclampsia, poor foetal development,⁵⁰ and complications during delivery.⁵⁵⁻⁶⁰ Excess weight gain during pregnancy and failure to lose weight after pregnancy have also been identified as important determinants of long-term obesity.⁶¹ Physical activity and breastfeeding have been proven to assist in controlling long-term weight after pregnancy.⁶¹ Physical inactivity of the mother during pregnancy is also associated with poor health outcomes for the newborn infant and may predispose the child to obesity, and cardiovascular, respiratory, pancreatic and kidney diseases later in life.^{50, 62, 63}

In the absence of medical or obstetric complications, contemporary guidelines⁶⁴⁻⁶⁶ encourage physical activity during pregnancy, not only to prevent the previously mentioned conditions, but also to foster physical, mental and social wellbeing. Although

wellbeing is commonly used in the context of psychological wellbeing, for the purposes of this thesis, the World Health Organization’s definition of health was used to describe wellbeing: “a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity”.⁶⁷ Benefits to women’s wellbeing, that appear to be associated with antenatal physical activity, are outlined in Table 1.1. In addition, promoting physical activity among mothers may also improve overall family wellbeing, as maternal psychological conditions such as depression have been associated with reduced paternal psychological wellbeing, and diminished family and child functioning.⁵¹

Table 1.1 *Potential benefits of appropriate physical activity during pregnancy and postpartum*

<p><u>Physical Health Benefits:</u></p> <ul style="list-style-type: none"> • Maintain healthy body weight and avoid excessive fat accumulation^{68, 69} • Maintain or improve cardiovascular fitness, muscular strength, endurance and flexibility^{59, 68, 70} • Decreased musculoskeletal complaints such as back pain^{69, 71} • Decreased minor discomforts of pregnancy⁷² • Improved posture and body mechanics, which may improve coordination, balance and body awareness^{69, 71, 73} • Prevention and treatment of problems associated with gestational diabetes, hypertension and preeclampsia^{55-58, 69} • Improved energy level and sleep⁶⁴ • Increased likelihood of vaginal delivery⁷⁴ • Reduces risk of miscarriage⁷⁵ • Possible easing of labour with fewer complications of delivery and faster postnatal recovery^{59, 60, 69} • Positive effect on breastfeeding: higher milk volume and milk energy output⁷⁶ <p><u>Mental health benefits:</u></p> <ul style="list-style-type: none"> • Stress reduction and improved psychological wellbeing^{64, 69, 72, 77, 78} • Enhanced self-esteem and body image^{79, 80} • Improved mood⁸¹ • Decreases likelihood of depression and anxiety during pregnancy^{82, 83} • Helps to prevent, reduce or manage postnatal depression^{74, 84} • Improved energy level and sleep^{64, 85}
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1.4 Antenatal and Postnatal Physical Activity Patterns

Previous research in America, Canada and England documented that women decreased the duration, frequency, and/or intensity of physical activity once they became pregnant,^{47-49, 86} with leisure-time physical activity declining even further after childbirth.⁸⁶⁻⁸⁸ A longitudinal study in a diverse sample of women showed that during the second trimester of pregnancy, women were significantly less sedentary compared to the first and third trimester.⁸⁹ Low intensity physical activity was also more frequent during the second and third trimester compared to the first trimester of pregnancy. However, these findings were not statistically significant. Moderate intensity physical activity was similar during the first and second trimester, but significantly lower during the third trimester.⁸⁹ Participation in vigorous intensity activity was low during all trimesters. Overall, total energy expenditure was highest in white non-Hispanic women and positively associated with increasing education and a history of previous live births⁸⁹. Another longitudinal study that focused on type of activity rather than intensity, showed that domestic activity remained unchanged over the course of pregnancy, but occupational and recreational activity declined significantly.⁹⁰ In relation to physical activity patterns among Australian pregnant women, nationally representative data seems to be lacking. However, Australian studies did find that the birth of a child significantly decreased women's physical activity behaviour⁹¹ and that Australian mothers of young children are a sub-group with low levels of physical activity⁹² of which up to two-thirds are not sufficiently active for health benefits.^{93, 94} Since it is not expected that Australian women behave differently to women in America, Canada, England and Sweden, it can be suggested that Australian pregnant women and mothers may be at risk for inactivity related conditions and miss out on the benefits of physical activity.

1.5 Physical Activity Guidelines during Pregnancy

Conservative risk management principles suggest that before participating in any exercise, pregnant women should obtain a medical clearance⁹⁵ to verify whether any contraindications for exercise exist. These contraindications are listed in Table 1.2. If women experience absolute contraindications, only low intensity and incidental activities are advised. Relative contraindications can be superseded if the benefits outweigh the

risks of exercise. In some instances, these individuals can exercise with caution and/or using low level end points, especially if they are asymptomatic at rest.⁹⁶ Such decisions should therefore be based on the woman’s own needs and the advice of her physician or obstetrician.

Table 1.2 *Relative and absolute contraindications to exercise during pregnancy*⁶⁴

<p>Relative contraindications:</p> <ul style="list-style-type: none"> • Severe anaemia • Unevaluated maternal cardiac arrhythmia • Chronic bronchitis • Poorly controlled type I diabetes • Extreme morbid obesity • Extreme underweight • History of extremely sedentary lifestyle • Intrauterine growth restriction in current pregnancy • Poorly controlled Hypertension/preeclampsia • Orthopaedic limitations • Poorly controlled seizure disorder • Poorly controlled thyroid disease • Heavy smoker 	<p>Absolute contraindications:</p> <ul style="list-style-type: none"> • Haemodynamically significant heart disease • Restrictive lung disease • Incompetent cervix/cerclage • Multiple gestation at risk for premature labour • Persistent second or third trimester bleeding • Placenta praevia after 26 weeks gestation • Premature labour during the current pregnancy • Ruptured membranes • Pregnancy induced hypertension
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The Canadian Society for Exercise Physiology (CSEP) has developed a convenient checklist and prescription for use by health and fitness professionals to evaluate pregnant patients or clients who want to enter a prenatal fitness program and for ongoing medical surveillance (Appendix 1). If women were previously sedentary or less active than the recommended “30 minutes of moderate intensity physical activity on at least 5 days, if not all days a week”⁶⁴, intensity and duration should be increased gradually until meeting this recommendation if no medical or obstetric complications are present. Guidelines presented in the following sections include guidelines recommended by Sports Medicine Australia (SMA), the American College of Obstetricians and Gynecologists (ACOG), and the joint CSEP and Society of Obstetricians and Gynaecologists of Canada (SOGC) clinical practice guidelines.⁶⁴⁻⁶⁶ The next sections describe the physical activity guidelines on recommended types of activities, duration, frequency, intensity, and also discuss physical

activity restrictions, safety precautions, warning signs and contraindications to exercise during pregnancy. Table 1.3 provides an overview of these guidelines.

Table 1.3 *Physical activity guidelines during antenatal and postnatal period*⁶⁴⁻⁶⁶

Physical activity guidelines during antenatal period
<ul style="list-style-type: none"> • Before exercise participation, women should obtain a medical clearance. • The general physical activity recommendation during pregnancy, in absence of medical or obstetric complications, is 30 min of moderate intensity physical activity on at least 5 days if not all days a week. • Gradually increase exercise intensity and duration if previously sedentary. • Moderate intensity activities like swimming, stationary cycling, swimming, low-impact aerobics such as water aerobics, and stretching are recommended activities during pregnancy. • Lifting light to moderate weights is encouraged to develop or maintain strength. • Pregnant women should do at least 4 lots of pelvic floor contractions each day. • In order to maintain physical fitness during pregnancy intensity should be 60–90% of maximal heart rate and 60–70% of maximal heart rate for previous sedentary women. • Moderate intensity should be based on ratings of perceived exertion with a rating between 12 and 14 in addition to the heart rate method. • The “talk test” should also be retained as a final check to avoid overexertion, which implies that pregnant women should be able to maintain a conversation during exercise. • Women should stop exercising when fatigued, not exercise to exhaustion and get plenty of rest. • Do not exercise in the supine position after the 4th month and do not stand motionless for long periods of time. • Women should not perform exercise that could cause a loss of balance • Because of a decrease in blood pressure in the second trimester, women should avoid rapid changes of position (from lying to standing and vice-versa) to prevent dizzy spells. • Women should prevent getting overheated: Avoid exercise in hot or humid weather and in areas with poor ventilation, wear clothing that is cool and allows ventilation (e.g. cotton) and drink plenty of water. • Participation in competitive sports is acceptable during the first 16 weeks of pregnancy if risk is accepted, but contact sports are considered safe only in the first trimester. • Jumping and sudden changes of direction should be reduced and then avoided during the third trimester. • Women should avoid high-altitude activities, scuba diving, water skiing, martial arts, gymnastics and trampolining are not recommended during pregnancy. • Women should discuss individual sports and training programs with a sports medicine practitioner and obstetrician. • Women should be told to pay attention to the warning signs to discontinue exercise and consult with prenatal health advisor when they experience of these signs.
Physical activity guidelines during postnatal period
<ul style="list-style-type: none"> • After a normal vaginal delivery gentle exercise including pelvic floor, abdominal exercises and walking can be commenced when comfortable. • After a caesarean section, 6 weeks is the recommended time to return to gentle exercise if the wound is well healed. • In case of vaginal delivery, more intense exercise should be delayed for up to 6 weeks and gradually increased to preferred intensity level, duration and frequency. • There are no general recommendations for when to resume more intense exercise after a caesarean section, assumingly this will depend on the healing process and the opinion of the mother and physician.

1.5.1 Type of Activity

Physical fitness is the desired outcome from physical activity and holds many health benefits for pregnant women and mothers as discussed in section 1.3. Physical fitness has been defined as “the ability to carry out daily tasks with vigour and alertness, without undue fatigue and with ample energy to engage in leisure time pursuits and to meet the above-average physical stresses encountered in emergency situations”.⁹⁷ For the development and maintenance of fitness during pregnancy physical activity should include the same elements as before pregnancy, which consists of activities to improve cardiorespiratory (aerobic exercise) and musculoskeletal (resistance exercise) status.⁹⁸ Non-impact sports like swimming, walking, jogging, stationary cycling, low-impact aerobics such as water aerobics, and muscle strength exercise involving lifting light weights with multiple repetitions lifted through a dynamic range of motion, are considered safe and beneficial throughout pregnancy.^{65, 98}

The pelvic floor muscles are weakened during pregnancy and birth (vaginal delivery), and can cause problems such as incontinence.⁶⁵ It is therefore important for women to condition the pelvic floor muscles throughout pregnancy.

Sports with minimal contact (e.g., racquet sports and netball) are considered safe in the first trimester with the possibility of continuing into the second trimester depending on the circumstances (i.e. level of competition, fitness of the mother and state of the pregnancy)⁶⁵. Contact and collision sports (e.g., soccer and basketball) are considered safe only in the first trimester. Although research on the effect of heavy lifting is inconsistent, SMA classifies this as potentially dangerous, particularly in the later stages of pregnancy and therefore not recommended.⁶⁵

1.5.2 Physical Activity Intensity

Physical activity intensity refers to how much energy is expended when engaging in physical activity.⁹⁹ Physical activity intensity is often the most difficult component of an exercise regimen to prescribe for pregnant women as a whole, because it is an individual matter. The intensity depends on the woman’s health status and fitness level pre-pregnancy. It is widely acknowledged that when prescribing physical activity intensity

during pregnancy, the conventional heart rate method should not be used on its own.^{65, 66, 98} The heart rate method is less precise, because resting heart rate is increased and maximal heart rate is decreased during pregnancy.^{65, 66, 98} The joint SOGC/CSEP clinical practice guideline⁶⁶ describes 3 methods to overcome this barrier: 1) modified heart rate method, 2) ratings of perceived exertion (RPE), and 3) the talk test. Each method can be used on its own, but it is preferred to use these methods simultaneously. The modified heart rate method accounts for the reduction in maximal heart rate. A modified version of the conventional age-corrected heart rate target zone can be found in Table 1.4.

Table 1.4 *Modified Heart Rate Target Zones for Aerobic Exercise in Pregnancy*⁶⁶

Maternal age	Heart Rate Target Zone (beats/minute)	Heart Rate target Zone (beats/10 sec)
Less than 20	140-155	23-26
20-29	135-150	22-25
30-39	130-145	21-24
40 or greater	125-140	20-23

It is recommended to use RPE as these are not significantly altered by pregnancy or advancing gestational age. Borg’s conventional 15-point scale (ratings range from 6 until 20) is recommended for this purpose, with a rating of 12 to 14 (“somewhat hard”) identified as the appropriate RPE range for most pregnant women.^{66, 98} Borg’s rating of perceived exertion is presented in Table 1.5. The “talk test” should be retained as a final check to avoid overexertion. As the term “talk test” implies, the woman is active at an appropriate intensity if she is able to maintain a conversation throughout her activity, and should reduce the intensity if this is not possible.⁶⁶ In addition, women should stop exercising when fatigued, not exercise to exhaustion and get plenty of rest.⁶⁵

1.5.3 Duration and Frequency

In absence of any medical or obstetric complications, the physical activity recommendation for pregnant women is defined as “30 minutes of moderate intensity physical activity on at least 5 days, if not all days a week”.⁶⁴ It is also advised that when starting an aerobic exercise program, previously sedentary women should start with 15 minutes of continuous physical activity three times a week, increasing gradually to 30 minute sessions on at least five times per week.⁶⁶ Realistic goals of aerobic conditioning during pregnancy would be maintaining a good fitness level throughout pregnancy without trying to reach peak fitness or train for athletic competitions. Individual sports and training programs should be discussed with a sports medicine practitioner and obstetrician with knowledge of the impact of strenuous exercise on maternal and foetal outcomes.⁶⁶

Table 1.5 *Borg's ratings of perceived exertion*^{66, 98}

6	
7	<i>Very, very light</i>
8	
9	<i>Somewhat light</i>
10	
11	<i>Fairly light</i>
12	
13	<i>Somewhat hard</i>
14	
15	<i>Hard</i>
16	
17	<i>Very hard</i>
18	
19	<i>Very, very hard</i>
20	

1.5.4 Precautions and Restrictions during Pregnancy

Before prescribing prolonged exercise (over 45 minutes of continuous exercise) regimens for pregnant women, appropriate thermoregulation needs to be considered. During pregnancy, basal metabolic rate, and therefore heat production, is increased above non-pregnant levels. If heat production exceeds heat dissipation capacity, for example during exercise in hot and humid conditions or during very high intensity exercise, the core temperature will continue to rise. During prolonged exercise, loss of fluid as sweat may compromise heat dissipation. An increase in maternal core temperature of more than 1.5°C during the first eight weeks of pregnancy has been observed to cause major congenital malformations.⁹⁸ Although it was found that 30 min of moderate intensity physical activity increased the body temperature less than 1.5°C, attention to proper hydration and subjective feelings of heat stress are critical to heat balance.⁹⁸ Hyperthermia can be prevented by avoiding exercise in hot or humid weather and in areas with poor ventilation, wearing clothing that is cool and allows ventilation (e.g. cotton), and drinking plenty of fluids before, during, and after exercise.⁶⁵

Another precaution is related to balance, coordination and blood pressure. As pregnancy progresses, weight increases, which causes changes in weight distribution and body shape. The body's centre of gravity moves forward, which alters balance and coordination. Performing exercises that could cause a loss of balance should therefore be avoided. Standing motionless for long periods of time is also not recommended, and because of a decrease in blood pressure in the second trimester, women should avoid rapid changes of position from lying to standing and vice versa in order to prevent dizzy spells. It is also not recommended to exercise in the supine position after four months.^{65,}

⁹⁸

In addition, activities including jumping and sudden changes of direction should be reduced and then avoided during the third trimester as all ligaments gradually loosen during pregnancy to prepare for birth. Activities that should be avoided at all times during pregnancy include scuba diving, water skiing, martial arts, gymnastics, trampolining and high-altitude activities such as parachuting.^{65,98}

Finally, women should consult their physician or obstetrician when experiencing any of the symptoms presented in Table 1.6.^{65,98} Women should also consult their physician or obstetrician regarding exercise if experiencing any of the conditions under the relative contraindications and not exercise when experiencing any of conditions listed under the absolute contraindications. Table 1.2 presented both relative and absolute contraindications.^{65,98}

Table 1.6 *Warning signs to discontinue exercise during pregnancy*^{65,98}

<ul style="list-style-type: none"> • High heart rate • Dizziness • Headache • Uterine contractions • Amniotic fluid leakage 	<ul style="list-style-type: none"> • Nausea • Chest pain or problems with the heart beat • Muscle weakness • Vaginal bleeding • Faintness 	<ul style="list-style-type: none"> • Stomach pain, mostly in back or pubic area • Shortness of breath before being active • Extreme fatigue • Insufficient weight gain 	<ul style="list-style-type: none"> • Pain in the pelvic area • Less foetal movement • Calf pain or sudden swellings of ankles, hands, and face
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1.6 Physical Activity Guidelines after Childbirth

After a normal vaginal delivery SMA, ACOG, SOGC and CSEP recommend that gentle exercise including pelvic floor, abdominal exercises and walking should be commenced when comfortable, but more intense exercise should be avoided for the first 6 weeks.^{64,98,100} After these 6 weeks, physical activity levels should be gradually increased to a preferred intensity level, duration and frequency with aiming for at least 30 minutes of moderate intensity physical activity on five days of the week.

It is important to recommence pelvic floor muscle exercises when comfortable as it can prevent loss of bladder control.⁶⁶ As ligaments and joints continue to be softened for at least another three months postnatal, any high impact exercises or sports that involve rapid direction changes should be avoided during this time, and stretches ought to be gentle. Activities that place stress on unstable pelvic floor muscles or hip joints should be avoided as well.^{98,100} Although not included in ACOG or RACOG guidelines it has also been advised that if during pregnancy the rectus abdominal muscle at the midline has split, a

condition called diastasis recti, it is important that the muscle has recovered before initiating any intense abdominal workouts.^{101, 102}

In order to improve breast support and comfort during physical activity after childbirth, it is recommended that women wear an appropriate bra that offers good support, and to exercise after breastfeeding rather than before when breasts are full and heavy. Breastfeeding before exercise also avoids the potential problems associated with increased acidity of milk secondary to any build-up of lactic acid.^{98, 100} To mentally benefit from physical activity in regard to prevention of postnatal depressions, exercise has to be stress relieving, not stress provoking.⁶⁴ In addition, women should not continue with exercise if the discomfort is greater than can be reasonably expected with the level of exercise undertaken and should slow down or stop when feeling breathless or lightheaded. If experiencing any changes in postnatal vaginal flow (lochia), a physician or midwife should be consulted as this can be caused by too intense physical activity.¹⁰⁰

1.6.1 Physical activity precautions after a caesarean section

After a caesarean section, six weeks is the recommended time to return to gentle exercise if the wound is well healed. To reduce the risk of blood clots women should follow instructions provided by hospital staff carefully, particularly regarding post-operative leg movements and breathing exercises. Once at home, women should follow all self-care recommendations provided by their physician. There are no general recommendations for when to resume more intense exercise after a caesarean section as it depends on the healing process.^{98, 100} Table 1.3 represents a summary of the key guidelines of physical activity during the antenatal and postnatal period.^{65, 98}

1.7 Literature Review as a Method

Within this PhD, multiple methods (i.e., literature review, intervention review, and longitudinal study) have been used in order to strengthen the study and ensure a comprehensive understanding of the determinants of physical activity during pregnancy and postpartum. These methods are discussed in section 1.8 and are described fully in Chapter 3. The two reviews (determinant analysis and intervention review) provide an

analysis of prior studies investigating determinants of physical activity and effectiveness of physical activity interventions, which have been identified as important existing source of intelligence to inform future intervention design.⁸ This thesis therefore discusses the reviews as part of the results rather than as part of the introduction, the latter being more conventional for a thesis. Via methodological triangulation¹⁰³ (described in Chapter 3, section 3.5), the findings from the literature review, the intervention review and the longitudinal study were combined to inform the final determinant analysis (see Chapter 9, section 9.1). Consistent with the temporal sequence (see Chapter 3, section 3.1), the literature review held a double function: 1) informing the longitudinal study (in other words identified gaps in the relevant research), and 2) informing the final determinant analysis. The literature review serves as a method and as a justification for the longitudinal study. The need for the longitudinal study is discussed in section 1.9. The full justification for the longitudinal study is described in Chapter 3, section 3.4 and Chapter 4, sections 4.1.9, 4.2.4, 4.3.7 and 4.4.

1.8 Purpose of Study - Research Objectives

To understand women's physical activity behaviour during pregnancy and postpartum, this multi-method study explored the determinants of physical activity as experienced by women going through these life stages. It was also investigated how women give meaning to their life and physical activity experiences during pregnancy and postpartum, and how these meanings relate to and are shaped by social structures or dominant ideology (e.g., dominant ideas, attitudes, values, expectations, and assumptions) around physical activity, pregnancy and motherhood. This knowledge was then used to inform implications for intervention design that promotes women's physical activity behaviour to a recommended level for optimal health. The study included a number of methods, described fully in Chapter 3:

- 1) A literature review for the purpose of determinant analysis,
- 2) An intervention review, and
- 3) A longitudinal qualitative study.

The literature review explored the determinants of physical activity among nulliparous women, pregnant women and mothers. The intervention review aimed to inform the

determinant analysis by identifying the addressed determinants within interventions that were effective in increasing physical activity in antenatal and postnatal women. In the longitudinal study, a group of women were recruited, who were in the early stages of pregnancy. These women were followed up over time until 3 months postpartum in order to understand the variety of determinants that influence their physical activity behaviour during this phase in their life. The research questions for the overall study are:

- 1) What part does physical activity play in women's lives and how do their lives and physical activity behaviours change throughout pregnancy and the first three postnatal months?
- 2) How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy and the first three postnatal months?
- 3) How do women give meaning to their physical activity experiences in everyday life throughout pregnancy and the first three postnatal months?
- 4) What are the implications for intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and the first three postnatal months?

1.9 The Significance of the Study

Many women do not engage in sufficient physical activity in order to achieve health benefits, particularly during the antenatal and postnatal period.^{47-49, 86-88} Despite the reduction in physical activity behaviour and associated health risks and negative economic impact, there is limited research in Australia exploring the determinants of physical activity during and after pregnancy, particularly with the goal to inform intervention design.^{104, 105} More research is needed on the individual and environmental determinants of physical activity behaviour among Australian antenatal and postnatal women. Conducting research to address these issues therefore has a practical as well as a theoretical significance.

The amount of public health funding that is directed towards improving physical activity levels Australia wide, is less compared to other health risk factors and also very small compared to the potential health and economic gains associated with optimal levels of

physical activity.¹⁰⁶ It is suggested that more data needs to be collected in order to inform policy and programs across all sectors that are directed at improving the physical activity levels of Australians including pregnant and postnatal women.¹⁰⁶

Intervention researchers have also argued for a need to improve understanding of the determinants of physical activity behaviour in order to identify high leverage points for strategy development.^{107, 108} After recent exercise based and lifestyle counselling programs, researchers concluded that other types of interventions are much needed to engage pregnant women in physical activity.^{109, 110} Attention to understanding the determinants of physical activity, particularly as experienced by Australian pregnant and postnatal women, is therefore an important part of the intelligence-gathering process in intervention development.⁸

No published, peer-reviewed longitudinal studies were located in the literature published between the beginning of January 2000 and the end of December 2012 (see Chapter 4). A longitudinal investigation could enhance in-depth understanding of the determinants of physical activity throughout pregnancy and postpartum and how these may change over time. Similarly, a limited number of studies were located that explored women's life and physical activity experiences, and how women give meaning to their physical activity experiences during pregnancy or postpartum.^{104, 111, 112} A woman centred view could offer health experts an improved understanding of the full context of women's participation in physical activity. With an improved understanding, they may be better positioned to work together with women towards change.

Therefore, this PhD sets out to investigate: life and physical activity changes; determinants of physical activity behaviour; and how women give meaning to their everyday physical activity experiences, including how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. The overall study provides an in-depth understanding of life and physical activity changes, and develops a comprehensive determinant analysis of physical activity during pregnancy and postpartum based on an extensive literature review, intervention review and longitudinal study. It also describes how women give meaning to their physical activity experiences within existing social structures around physical activity, pregnancy and

motherhood. The purpose of investigating how women give meaning to their physical activity experiences was to strengthen the determinant analysis by providing information about ways in which social determinants and structures serve to reinforce dominant ideology around health and how these encumber physical activity during pregnancy and postpartum. Life and physical activity changes were investigated to understand further contextual complexities that operate around and associate with the determinants of physical activity. These contextual considerations and the comprehensive determinant analysis informed the implications for future intervention design.

1.10 Structure of the Thesis

This thesis is comprised of ten chapters. This first chapter has provided an introduction to the thesis in which the multitude of issues, related to insufficient physical activity, have been discussed from a public health perspective. It also discussed the benefits of physical activity during and after pregnancy and provided background information regarding physical activity guidelines during and after pregnancy. This chapter also addressed the significance and justification for the study, and described the research objectives. The content of each of the following chapters is described below:

Chapter 2. This chapter provides a description and rationale for the research paradigm and conceptual frameworks, which underpin the logic behind this PhD. It provides a description of and justification for the combination of a socio-ecological and a feminist approach, and describes these approaches in further detail.

Chapter 3. This chapter discusses the temporal sequence of the overall study and the methods used within each segment of the study. The chapter explains: the study design, the aim and research questions; justifies the choice of the various research methods; and describes recruitment, sample selection, data collection, coding and analysis, and the limitations of each method.

Chapter 4. This chapter discusses the findings of the literature review to inform determinant analysis. In order to identify which physical activity determinants need further investigation among pregnant and postnatal women, and to identify possible

gender-specific determinants of physical activity, findings from empirical studies among women were compared with findings from review studies among the general population. This chapter therefore provides a justification for the interview protocol used in the longitudinal study.

Chapter 5: This chapter reviews previous interventions effective in increasing physical activity behaviour in nulliparous women, pregnant women and/or mothers, by looking at the determinants that were addressed in each intervention, in order to inform determinant analysis and intervention design.

Chapter 6. This chapter represents the findings of the longitudinal study relating to women's life and physical activity changes throughout pregnancy and the postnatal phase.

Chapter 7. This chapter represents the findings and discussion of the longitudinal study related to the socio-ecological analysis. Individual, social and physical environmental determinants influencing women's physical activity behaviour throughout pregnancy and the postnatal phase are examined.

Chapter 8. This chapter provides a feminist interpretation of the data. This chapter builds on the socio-ecological analysis for a more profound understanding of the struggles and opportunities women face in relation to physical activity during pregnancy and the postnatal period. It discusses how women give meaning to their physical activity experiences, and how these meanings relates to and are shaped by dominant ideology around physical activity, pregnancy and motherhood.

Chapter 9. This chapter discusses the comprehensive determinant analysis in relation to physical activity behaviour during pregnancy and postpartum. This comprehensive determinant analysis is based on the literature review, intervention review and the longitudinal study. It also discusses the contextual considerations based on women's life and physical activity changes and the feminist analysis. The comprehensive determinant analysis and contextual considerations provided the basis for the implications for future intervention design. The last section in this chapter discusses the importance of

strengthening and building partnership to improve physical activity levels among pregnant and postpartum women.

Chapter 10. This final chapter provides a conclusion in relation to the research questions, and the contribution of this PhD to current knowledge. It also discusses suggestions for future research and explains why taking action towards increasing physical activity during pregnancy and postpartum should be treated as an urgent matter.

Chapter 2. Paradigm and Conceptual framework

2.0 Introduction

Chapter 1 introduced the research problem and the justification for this research. This chapter provides the rationale and justification of the chosen paradigm and the multi-method design. It also discusses why an extensive determinant analysis was used in order to inform implications for intervention design.

2.1 Pragmatist Paradigm

A paradigm can be viewed as a set of beliefs, which represents a worldview that defines the nature of the world for its holder, the individual's place within it, and the range of possible relationships to that world and its elements such as cosmogonies¹¹³. A paradigm can therefore be viewed as "a comprehensive belief system, world view, or framework that guides research and practice in a field".¹¹⁴

The paradigm adopted for this research is pragmatism; a deconstructive paradigm¹¹⁵ that sidesteps the debatable issues of reality and truth¹¹⁶ and instead focuses on what works as the truth in relation to the research questions.¹¹⁵ A pragmatism paradigm¹¹⁶⁻¹²² was chosen, because of its following characteristics:

- It rejects the notion that one has to choose one paradigm, which has previously resulted in paradigm wars.
- It considers research questions to be more important than either the method or paradigm that underlies the method,
- It avoids the use of metaphysical concepts (e.g. truth, reality) that have caused much endless discussion and debate,
- It accepts the use of a mixed method and multi-method design
- It offers a pragmatic method for solving traditional philosophical dualisms as well as for making methodological choices,
- It prefers a more moderate and common sense versions of philosophical dualisms based on how well they work in solving problems,

- It generally rejects reductionism (e.g., reducing culture, thoughts, and beliefs to nothing more than neurobiological processes).

During the study development, it was acknowledged that having to choose one paradigm would limit the study's possibilities, which would reduce the data richness and quality of the final determinant analysis and the implications for intervention design. Because the requirements during different phases of the study were believed to differ, it was considered more effective to choose the right tool for the job at hand instead of adhering to one approach.

A multi-method design was chosen as it was expected to produce a more comprehensive view of the struggles and opportunities related to physical activity during pregnancy and postpartum. The term multi-method design should not be confused with mixed method design. Previously, the term mixed methods design has caused much confusion as it can refer to 1) a design consisting of qualitative and quantitative methods, and 2) a design that consists of two different methods or procedures of data collection each of which is from a similar research approach, either qualitative or quantitative.¹²¹ In order to eliminate this confusion, the latter definition has been renamed to multi-method design.¹²¹

In order to generate the best outcome for this study, two approaches were used in order to investigate physical activity among pregnant and postnatal women: 1) a socio-ecological approach, and 2) a feminist approach. These two approaches served different purposes. A socio-ecological approach was used to organise and categorise identifiable determinants of physical activity. The feminist approach was used with the longitudinal study in order to describe how women give meaning to their physical activity experiences, and how these meanings relate to and are shaped by dominant ideology (e.g., dominant ideas, attitudes, values, expectations, and assumptions) around physical activity, pregnancy and motherhood in order to identify struggles and opportunities for physical activity. Both approaches informed the implications for intervention design.

2.1.1 Widening the Lens

A shift to a more comprehensive approach that acknowledges the importance of the environment is needed,¹²³ especially when aiming to inform the development of intervention strategies that target changes in large populations such as pregnant women.¹²⁴ A general acceptance of the need for multilevel perspectives can be seen in documents guiding public health and science, and policy agendas such as Healthy People 2010¹²⁵ and the Institute of Medicine's report.¹²⁶ However, research on the social and physical environment in relation to physical activity behaviour among antenatal and postnatal women is limited. In this thesis a multilevel perspective is taken as follows. The socio-ecological approach identified and categorised the determinants in order to focus future intervention planning. The feminist approach aimed to provide an in-depth understanding of how women give meaning to their physical activity experiences, and how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood.

Both approaches have similarities; however, there are some discrepancies. The socio-ecological model provides a critique of the medical model advocating for an understanding that health is a product of individual, social and physical environmental factors.¹²⁷ In this manner, the socio-ecological approach and feminism agree that 'health' goes beyond the physical body to consider the broader determinants of health and create a more holistic understanding of health.¹²⁸ Previously, health promotion practitioners have combined these two approaches in their work to enable people to increase control over, and improve their health while being aware of the influence of the social determinants.¹²⁹ The concepts of empowerment and community organisation are central tenets of both feminist and health promotion theory.^{130, 131} Empowerment can be broadly viewed as "increasing people's freedom of choice and action to shape their own lives".¹⁰ It is the process of enhancing an individual's or group's capacity to make choices and to transform those choices into desired actions and outcomes.¹¹ Empowerment can be seen as the increase in agency:¹³² individual's or group's level of freedom to do and achieve in pursuit of whatever goals or values are regarded as important.³

While the socio-ecological approach and feminist theory have much in common, there is a key difference. The socio-ecological approach is mostly successful in identifying the key

determinants that influence health and wellbeing, however it does not examine the ways in which social structures and dominant ideology around health influence health behaviours¹³³ such as physical activity. The combination of both lenses can assist with developing a more comprehensive understanding of women's physical activity behaviour during pregnancy and postpartum. This comprehensive understanding can improve future intervention design in order to increase physical activity among pregnant and postnatal women.

2.1.2 Socio - Ecological Framework

A socio-ecological framework was used for the purposes of the literature review, intervention review and for the first level of analysis in the longitudinal study. The socio-ecological framework was used to explore, identify, and categorise physical activity barriers and facilitators into individual, social and physical environmental determinants. Ecological models of health behaviour focus on individual influences as well as on social and physical environmental factors that may facilitate or inhibit individual behaviour.¹²⁷ Ecological models hypothesise that multiple levels of influence determine individual behaviour. Socio ecological frameworks emphasise the importance of addressing both intrapersonal and environmental factors in the design of health promotion interventions. Interventions that solely focus on individual factors often alter individual behaviour initially, but once the intervention has finished, social and physical environmental factors often influence people towards returning to previous sedentary behaviour.¹³⁴

Individual determinants may include cognitive factors such as knowledge, attitudes, and self-efficacy. The social environment can be defined as “the shaping norms that enforce patterns of social control, provide or not provide environmental opportunities to engage in particular behaviours, reduce or produce stress, and place constraints on individual choice”.³¹

Effective public health determined on promoting physical activity must address modifiable social environmental determinants that can support behaviour change.¹³⁵ This is likely to be particularly relevant in the pregnancy and postpartum life stage, because of the significant social and lifestyle changes that commonly occur during these periods.⁴⁶

The three most commonly studied groups of social determinants of physical activity are (1) interpersonal relationships (e.g., social support and social networks), (2) social inequalities (e.g., socioeconomic status (SES) and income inequality), and (3) neighbourhood and community characteristics (e.g., social cohesion, social capital and neighbourhood factors).^{34, 136-142}

The physical environment consists of both the built and natural environment. The built environment has been defined as “the combination of urban design, land use, and the transportation system, and encompasses patterns of human activity within the physical environment”.⁴⁵

The socio-ecological approach aimed to explore, identify and describe the individual, social environmental and physical environmental determinants of physical activity during pregnancy and postpartum in order to focus future intervention design. In order to strengthen the determinant analysis, the longitudinal study employed an additional analysis. A feminist analysis was used to deepen the understanding of how women give meaning to their physical activity experiences, and how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood.

2.1.3 A Feminist Lens

The literature review on the determinants of physical activity and the intervention review show that there is little attention given to the complexity of women’s physical activity behaviour during pregnancy and postpartum. Within this research project, the longitudinal study adopted a feminist lens in order to explore, interpret and understand how women give meaning to their physical activity experiences in everyday life during the antenatal and postnatal phase. The longitudinal study also aimed to find out what women’s lived experiences teach us about the social structures around pregnancy and (early) motherhood that encumber physical activity during these life phases. A feminist lens was chosen to add more meaning to the socio-ecological analysis in order to improve understanding of women’s physical activity behaviour during pregnancy and postpartum. The findings of this analysis were used to inform implications for intervention design.

A feminist lens is important for understanding women's lived experiences within public health, because it has the potential to: 1) reveal hidden and unrecognised research areas, 2) identify the close interplay between social and biological factors (e.g. the interplay between sex, gender and social expectations, which will be explained later), and 3) inform future intervention design on how to increase agency among marginalised groups, leading to empowerment and social change.¹⁴³ Feminist perspectives argue that it is important to listen to what women have to say about their physical activity needs within the totality of their daily lives in families and communities.¹⁴⁴ It is important to speak about women's physical activity perspectives and experiences, and how these relate to and are shaped by social structures and dominant ideologies around physical activity, pregnancy and motherhood. For the purpose of this research project, dominant ideology has been defined as patterns of beliefs, ideas, opinions, and values that are used to create meaning.¹⁸ In other words, how women negotiate meaning around their physical activity experience can reveal dominant ideologies around physical activity, pregnancy and motherhood.

Investigating women's physical activity experiences during pregnancy and postpartum can reveal issues, struggles and tensions, and also sites of resistance and transgressions that are occurring as they negotiate dominant ideology around, for example, how pregnant women and mothers 'should' behave. Such understanding can assist in sensitising future physical activity interventions, so that intervention strategies reflect more understanding of women's perspectives and lived experiences in relation to physical activity, and the complex social structures surrounding such experiences. This improved understanding has the potential to improve the effectiveness of future interventions.

Pregnancy and early motherhood represent major life transitions for women in terms of their social, occupational and biological lives and this can profoundly influence their interest and ability to be involved in physical activity.¹⁴⁵ Professional recommendations about physical activity tend to be detached from women's everyday life experiences.¹⁴⁶ Women's own voices are important to research in relation to how they conform to, resist, transgress and/or renegotiate dominant ideology around physical activity during pregnancy and (early) motherhood.^{146, 147} These perspectives and lived experiences have

the potential to complement and enrich understanding of women's physical activity experiences by health promotion professionals and physical activity advocates. Without such understanding, experts tend to prescribe treatments without acknowledging women's everyday constraints.^{112, 148} For example, research has shown that social expectations around how a 'good' mother should behave encumbered women's freedom of choice.^{149, 150} By attempting to understand the full context of women's participation in physical activity as experienced by women, health experts may be better positioned to work together with women towards change.^{148, 151, 152} Including women as agents of change can empower women to improve their own physical activity behaviour and wellbeing, which could also improve family health and wellbeing.⁵¹

Placing women at the centre of inquiry as participants and consumers is a fundamental principle of feminist research,¹⁵³ which can be classified as research for women rather than research about women.¹⁵⁴ The longitudinal study encompasses these feminist beliefs in that it undertakes research from the perspective of antenatal and postnatal women in order to support the improvement of future physical activity interventions. The logic of understanding the target group's experience of an issue or event is not unique to feminist research. Pragmatists have suggested that understanding a target group's unique experiences in making healthful behavioural changes should be a central feature of good public health practice, and can contribute to empowering the target group in developing interventions over which they have ownership.⁸ However, a feminist approach offers more than providing information about women's experiences of physical activity, pregnancy and (early) motherhood. It provides an analytical tool for exploring how such experiences have been shaped by larger social structures. Such understanding can assist in the development of a robust intervention design that respects and appreciates women's lives and experiences, and understands the social structures that surround such lived experiences.¹⁵⁵

2.1.3.1 Feminist Standpoint Epistemology

Feminist standpoint epistemology was chosen as an analytical tool to explore how women give meaning to their physical activity experiences in everyday life throughout pregnancy and the first three postnatal months. The findings of this exploration informed the

implications for intervention design in order to promote and sustain appropriate physical activity for health benefits throughout the antenatal and postnatal phase (see third and fourth research question, Chapter 1, section 1.8). For the purpose of this dissertation, epistemology has been defined as “the study of the nature of knowledge and justification”.¹⁴ Standpoint feminism acknowledges women’s unique needs by setting women’s everyday experiences at the centre of research concerns, building on and from women’s lived experiences, employing feminist qualitative methods and assuming researcher reflexivity.¹⁵⁵ Feminist standpoint epistemology was chosen as its goals are in alignment with the goals in this thesis; 1) to understand women’s lived experiences and the knowledge women have cultivated from these experiences, 2) to critically examine society through women’s eyes, and 3) to apply the vision and knowledge of women to social activism and social change.

Key Principles of Feminist Standpoint Epistemology

In feminist standpoint epistemology, women’s everyday life experiences provide the starting point from which to build knowledge.¹⁶ The following key principles of standpoint feminism have been used to guide the feminist analysis:

- 1) Women’s standpoints and experiences are put at the centre
- 2) Knowledge is socially situated
- 3) Women’s capacity of double consciousness
- 4) Building knowledge by focusing on the diversity in women’s experiences
- 5) Reflexivity

Women’s concrete experiences consist of what women do; the wide and diverse range of activities that women engage in as part of their everyday lives.¹⁶ Standpoint refers to a “position” in society that is affected by and, in turn, can help shape structures of power, work and wealth.⁴⁰ Feminist standpoint scholars emphasise the need to start with investigating women’s lives, as women experience them – rather than relying on expert opinions – in order to achieve a more authentic and accurate understanding of the struggles, tensions, and transgressions women experience in their daily lives.¹⁶ The longitudinal study conducted a feminist standpoint analysis to recognise women’s physical activity experiences and how meaning was given to such lived experiences, and

to come to a better understanding of society as experienced by pregnant and postpartum women.

According to feminist standpoint, knowledge is socially situated. Longino³⁹ stresses that women's knowledge, and knowledge in general, is located in "particular places, in particular times". Women have different standpoints, and embody different knowledges, depending on many factors. Feminist standpoint scholars recognise that women come from a diverse range of socio-economic, cultural and ethnic backgrounds, and live in many different social realities.¹⁶ Investigating each woman's unique experience and standpoint directs attention to details and features that might otherwise be overlooked.³⁹ The literature review on the determinants of physical activity and the intervention review (Chapters 4 and 5) show that there is little attention given to the complexity of women's physical activity experiences during pregnancy and postpartum. It is therefore important to highlight these lived experiences and provide information about how antenatal and postnatal physical activity may be encumbered by dominant ideology around physical activity, pregnancy and motherhood.

The concept of women's capacity of 'double consciousness' is developed from the idea that women, as members of a group that may have experienced marginalisation in the past or the present, have cultivated a double consciousness;¹⁶ a heightened awareness of being a woman and of being a member of society. These positions can sometimes be in conflict, and awareness of these tensions can lead to insights about women's ways of living in the world. According to Nielsen,⁹ women are tuned in to the "dominant worldview of society and their own minority perspective". Smith¹⁵⁶ refers to this as a working, active consciousness of both perspectives. Relevant to this thesis, women's capacity for double consciousness can grow out of their awareness of being shaped by socially defined roles, such as those of wife and mother and the pressures that come with these, and also their desire to develop their own identity.¹⁶ For the purposes of this thesis, double consciousness is defined as women's awareness of their own perceptions and the dominant perceptions in society, which may or may not be in conflict with each other. Exploring how women negotiate dominant ideologies and their own perceptions and lived experiences in relation to physical activity during pregnancy and motherhood is useful as such exploration provides insights in terms of which societal attitudes encumber

women's physical activity behaviour and how women may negotiate and transgress such dominant viewpoints. This provides intervention developers with an improved understanding of which societal viewpoints need addressing and how to increase women's agency, so women can engage in physical activity more freely. Agency can be defined as an individual's or group's level of freedom to do and achieve in pursuit of whatever goals or values are regarded as important.³

Some feminist standpoint scholars argue that women's (historical or continuing) subordinate status in society (e.g., in the workforce and domestic sphere), and their capacity for double consciousness that evolves from it, place them in a privileged position from which to generate knowledge about the world.⁴²⁻⁴⁴ This concept is sometimes called "strong objectivity". The concept "strong objectivity" was developed and named by Harding. Harding^{42, 43} and Hartsock⁴⁴ argue that those who are disadvantaged are in a position to know more and to provide a less distorted and more reliable understanding of social reality compared to others in the same society who are advantaged.⁴³ Harding⁴² has urged researchers and scholars to engage in a process of critical evaluation to verify which social situations are likely to generate the most objective knowledge claims.

In contrast to Harding's concept of a "maximally objective" standpoint, but in resonance with her recent emphasis on difference¹⁵⁷ and Longino's views,³⁹ the feminist standpoint analysis conducted in the longitudinal study focused on identifying a diverse range of knowledge found within a multiplicity of standpoints. I agree with later feminist standpoint theorists^{39, 158} who have acknowledged that a maximally objective standpoint cannot be obtained as women embody different realities and knowledges. More importantly, women fulfil both dominant and marginalised positions as mothers, daughters, wives, employers and employees, and all these roles and positions affect their daily life experiences including physical activity. Each woman's standpoint presents a unique lived experience and perspective, and should be valued as such.¹⁶ Paying attention to the distinguishing characteristics of each woman's views and the diversity in women's lived experiences does not interfere with building knowledge. In fact, it has been suggested that it is precisely in doing this that new knowledge can be found.¹⁶ Highlighting the diversity in women's experiences and perspectives during pregnancy and postpartum therefore has the potential to develop new knowledge in relation to how

social structures around pregnancy and motherhood can encumber as well as facilitate engagement in physical activity.

Within standpoint feminism and other feminist perspectives, reflexivity is an important strategy for exposing the myth of total objectivity in scientific research.¹⁵⁹ It creates an attentiveness of the researcher's contribution to meaning constructions throughout the research process, and an acknowledgment of the impossibility of remaining outside of the subject matter while conducting research.²⁵ Reflexivity involves regularly reflecting upon the ways in which personal values, experiences, interests, beliefs, political commitments, wider aims in life and social identities shape the research.²⁴ In order to be transparent in how I could have shaped this research, I have provided a brief disclosure of my assumptions and pre-understandings that can be perceived as a framework on its own:

"I am a 28-year-old woman with no children, which means that I have come to this study with no personal experience of pregnancy or motherhood. I have only observed pregnancy and motherhood as a sister, friend and researcher.

I am an early-career researcher in the field of Public Health and I have come to this study with no formal knowledge about feminism, only with knowledge in relation to the lived experience of being a woman. However, as my understanding deepened in relation to the social determinants and social structures surrounding pregnant women and mothers and how these can restrict women in many ways, including engagement in physical activity, I found myself becoming more compassionately connected with women and the greater cause of feminist research. I now identify myself as a starting feminist researcher who feels committed to creating equal opportunities to self-care, such as physical activity, in order to improve physical and psychological wellbeing among women.

I am an active person with a BMI of 21. I engage in a variety of activities on a weekly basis such as running, swimming, cycling, crossfit, and yoga. To me, physical activity is something that helps to keep me physically fit and happy as it reduces stress and provides me with a more positive outlook on life. It also provides me with an opportunity to be around and meet new people, which is important to me.

I also come from an active family with my dad being a physical education teacher. I therefore acknowledge that I have come to this study with values about physical activity. I believe physical activity to be important for the overall wellbeing of ourselves as well as others; the better you feel, the better you treat others.

I was born and lived most of my life in the Netherlands and I acknowledge that I, like many Dutch people, have a very pragmatic and straightforward way of thinking and approaching issues.

I have studied health promotion and human movement science during my Bachelor degree and acquired a Masters degree in Public Health. I have worked as a personal trainer and as a research assistant and community worker on projects that aimed to increase physical activity among pregnant women and/or mothers in the Netherlands and Australia. I acknowledge that my education and work experience are likely to have influenced this study.

I was drawn to this group of participants because to me the pregnant woman is the starting point for improving physical activity levels and wellbeing in the following generations; if pregnant women are more active, their babies may be healthier. I believe that if children grow up in an active family, they may be more likely to remain active during adolescence and adulthood. If they are active during those periods of life, they may be more likely to continue living an active lifestyle once they start their own family."

I acknowledge that my values, education and lived experiences are likely to have influenced recruitment, data collection and data analysis as one can imagine that attitudes towards the recruiter/interviewer would potentially be different if completed by someone who did not value exercise, someone who was grappling with children, work and study simultaneously, an overweight person or someone with a different upbringing and/or educational background. During the interviews, I noticed that older women tried to prepare and educate me with their experiences for when I would have a child, while women of a similar age responded on a more equal level as if talking to a friend. Younger women initially appeared a bit more shy and hesitant when speaking, so I generally spent time making them feel comfortable (e.g., asking how their day has been, whether they have any exciting plans this weekend, or sharing a "funny" story) before starting the interview, to encourage them to speak more freely.

In relation to researcher reflexivity, Nielsen⁹ argues that the researcher's worldviews, histories, and biographies that are taken into the research projects are not necessarily corrupters of knowledge or truth claims. Instead, these views and lived experiences can guide researchers to particular research topics and/or participants with which/whom they find affinity. Similarly, Haraway¹⁶⁰ argues that the researcher's biography, history and positionality do not have to be perceived as barriers to achieving truth and building knowledge. Instead, these can offer each of us a unique way of seeing the world, which may allow us to catch, see, and/or understand phenomena in ways that others cannot. While I acknowledge that my assumptions and values are likely to have influenced the data analysis in this study, comments from participating women were included in the results to ensure that the research findings would more fully reflect women's perceptions.

The following sections further discuss the justification for choosing feminist standpoint epistemology, including the critique feminist standpoint has received; and provide an

introduction to how pregnancy and motherhood have been described in the literature as experiences and social constructions.

2.1.3.2 Justification of Feminist Standpoint Epistemology

Feminist research is primarily connected to feminist struggle.¹⁶¹ By exploring women's lived experiences and concerns, illuminating gender-based stereotypes and biases, and detecting women's knowledge, feminist research can challenge dominant structures in society. Previous feminist scholars have used feminist research to promote emancipation, empowerment, social change and social justice for women and other marginalised groups.¹⁶² Although many feminist issues were addressed before 1960, feminist research was established as a methodology during the second wave feminist movement in the late 1960s and 1970s.¹⁶² During this time, researchers became increasingly aware of the contradictions between women's lived experiences and mainstream research models, studies and findings. Mainstream theoretical and methodological frameworks often did not fully reflect women's perspectives.¹⁶² The failure of mainstream research to 'give voice' to women's experiences and perspectives prompted the involvement of early feminist researchers.

In varying degrees, depending on the feminist tradition, feminist researchers also critiqued the claims to objectivity and value neutrality within traditional, positivist research because such methods fail to take women's lives and experiences into account.¹⁶² Feminist researchers questioned whether value-free research can give full voice to women's knowledge and lived experiences, and also questioned the strict separation between the researcher and the researched in positivist research.¹⁶² They argued for an alternative way of thinking about research and knowledge building.¹⁵⁶ Feminist approaches to epistemology and theory can be divided into three groups:¹⁶²

- 1) Feminist empiricism
- 2) Feminist standpoint epistemology
- 3) Feminist postmodernism

Feminist empiricists seek to understand the world around them, grounding their methodologies in what their senses can identify and what their methods can measure.¹⁶³

They are located in the positivistic belief that objective knowledge is obtainable.¹⁶³ For the purpose of the longitudinal study, feminist standpoint epistemology was preferred over feminist empiricism as this research project wanted to step away from positivist approaches (i.e., objectivity and value neutrality) that feminist empiricists, to some extent, still draw upon.¹⁶⁴

Feminist standpoint has been described as an epistemology rooted in dialectics as developed by Hegel and Marxian epistemology.¹⁶⁵ In 1807, Hegel analysed the master-slave relationship to show that what people 'know' about themselves, others, and society depends on which group they are in.¹⁶⁶ For example, slaves had different perspectives on the meaning of chains, laws, childbirth and punishment than their masters who participate in the same 'reality'. However, the ones in power decide what is reality and therefore what is written in the history books. Following Hegel's lead, Marx referred to the proletarian standpoint; it is the standpoints of the impoverished that will reveal social reality. Marx described them as society's 'ideal knowers' as long as they understand the class struggle in which they are involved.^{167, 168} By substituting "women" for "proletariat", and "gender discrimination" for "class struggle", early feminist standpoint theorists had a ready-made framework for advocating women's ways of knowing.¹⁶⁵ This shows that as initially presented within second wave feminism, feminist standpoint did not recognise difference and instead represented women as a homogeneous group. Thus, the differences between men and women were founded on the assumption that there is a universal 'woman'. Discussions of difference within the feminist community led third wave feminists to reassess feminist standpoint theory (critiques of feminist standpoint epistemology are described in the following section). Feminist standpoint within third wave feminism emphasises multiplicity, ambiguity, difference, paradox and conflict in relation to women's lived experiences.^{169, 170} Hirschmann¹⁷¹ argued that feminist standpoint theories share important characteristics with feminist postmodernism as it currently acknowledges multiple standpoints.

Within feminist postmodernism, the focus is on the symbolic construction of, for example, gender, identity, pregnancy and motherhood; on difference such as ethnicity, class and sexual orientation; or on social meanings within language and discursive practices.¹⁷² When observing the development of feminist standpoint, it must be noted that much of

the current ideas within feminist standpoint epistemology have been influenced by postmodernist thinking, especially the notions of sex, gender and social roles. In relation to sex and gender, feminist postmodernists, such as Butler,¹⁷³ argue that it is impossible to adopt a frame of reference that offers dualistic understanding of sex and gender, meaning that these concepts cannot be divided in male or female. In order to clarify, Butler¹⁷⁴ explains that the body and gender role are performed rather than representations of identity. With this notion she argues that there is no gender identity behind the expressions of gender, because identity is “performatively comprised of the very actions that are said to be the results”.¹⁷⁴ Therefore, the body can be viewed as discursively constructed so that sex and gender are unstable, historically situated and performatively exacted.¹⁷⁴ Similarly, Hausman¹⁷⁵ claims the authenticity of gender to inhabit in a particular system of knowledge, power and truth, rather than on or in the body. Other postmodern scholars have also argued gender to be primarily a property of social institutions and cultural practices rather than a property of the individual.^{176, 177} Such notions have been important to reconsider gender and social roles as socially constructed rather than biologically determined.

Contemporary feminist standpoint theory does not reject notions of social construction of gender, social roles and identity. Both standpoint theory and postmodernism see these as socially constructed within historical and cultural contexts.¹⁷¹ In terms of agency or power, feminist standpoint epistemology acknowledges difference and therefore leaves space for group as well as individual agency.^{178, 179} Within this research project, using feminist standpoint as an analytical tool can highlight opportunities to improve individual and group agency among pregnant and postnatal women. By highlighting how women’s physical activity experiences related to and are shaped by dominant ideology around physical activity, pregnancy and motherhood, such restricting social structures can be addressed. Less restricted social constructions of gender, social roles and identity have the potential to increase women’s agency to engage in physical activity more freely. In addition exploring how women may resist, negotiate and transgress such dominant ideology also provides opportunities for increasing women’s agency.

However, feminist standpoint theorists do not investigate such social constructions in the same depth as feminist postmodernists. Postmodernists go further than the ‘situated

knowledges' of standpoint theorists by looking at the social world as continuously fluctuating. Feminist standpoint theory acknowledges that concepts such as identity, gender and gender roles – and therefore women's experiences – are shaped by social structures, and aims to identify these social structures. However, standpoint theory does not examine the assumptions terms such as 'gender' and 'identity' are based on. This is the key reason why feminist postmodernism (or more specific epistemologies within postmodernism such as poststructuralism) was not chosen as an analytical tool within the longitudinal study. Although such investigations and discussions are important, it was not considered to be fruitful for the purpose of this research project, particularly because the main aims of the feminist analysis were to:

- 1) **Strengthen the determinant analysis;** by providing an in-depth understanding of women's physical activity experiences during pregnancy and postpartum, and dominant social structures or ideology around physical activity that shaped those lived experiences.
- 2) **Inform future intervention design;** by providing information that can assist in developing intervention that reflects understanding of women's perspectives and lived experiences.

Critiques of Feminist Standpoint Epistemology

In the late 1980s and early 1990s, criticisms of feminist standpoint emerged. The concept of 'strong objectivity', developed by Harding^{42, 43} (see section 2.1.3.2), has received considerable critique. Nielsen⁹ explains that feminist standpoint claims to accuracy and objectivity are both promising and problematic. On the one hand, such claims (i.e., certain groups provide more objective and accurate knowledge and therefore a less distorted social reality than other groups in society) are true to the main purpose of attaining a more accurate, more complete understanding of society. On the other hand, the implicit notion that the experiences and perspectives of one group are more real or more accurate than another's is problematic. This research project did not aim to identify which women provided more accurate knowledge claims than others. As previously explained, my viewpoints are in line with perspectives of later feminist standpoint theorists,^{39, 158} who have acknowledged that a maximally objective standpoint cannot be obtained. Feminist

standpoint research should explore a diverse range of knowledge found within a multiplicity of standpoints.³⁹

However, this gives rise to another issue. Critics have argued that without objectivity, relativism results, which constitutes a dilemma. Brooks¹⁶ summarised these concerns in the following question: “Is it possible to value a diverse range of women’s perspectives and lived experiences **and** come together and create an organised force for social change?”. It is difficult to create one standpoint for all women, without risking the repression of differences between women. Conversely, valuing the diversity of women’s experiences and perspectives equally can cause stagnation, which encumbers women from “moving forward together and taking a stand on social issues”.¹⁶ To overcome this issue, many feminist standpoint scholars emphasise the need for “open dialogue between women and across different perspectives as a first step” towards capacity building as a solid basis to move forward from.^{39, 180} Although this research project did not include focus groups, through individual interviews women were asked how to move forward in terms of what programs, services or information they needed to engage in physical activity more freely (see Chapter 3, section 3.4.6). Diverse responses were yielded and are presented in Table 9.4 (see Chapter 9, section 9.3).

Within the longitudinal study, contemporary feminist standpoint epistemology allowed an in depth exploration of how women give meaning to their physical activity experiences during pregnancy and (early) motherhood. It also allowed a critical examination of society through women’s eyes. Such information is important to improve future intervention design; by creating physical activity strategies that show understanding of women’s perspectives and lived experiences during pregnancy and (early) motherhood in relation to physical activity engagement. As an introduction to the findings presented in Chapter 8, the following section provides some background on previous research in relation to pregnancy and motherhood as an experience and social construction.

2.1.3.3 Pregnancy and Motherhood

In relation to the concept of family, much feminist writing has theorised the family as being a socially organised unit that reflects gendered relationships within the wider

society.¹⁸¹ Phoenix et al¹⁸² argued that historically, women have continued to be defined as either mothers, potential mothers, or failed childbearers despite the fact that motherhood is only one component of women's identities. In the late 1980s and early 1990s, feminist researchers found the social construction of motherhood to be a narrow and limiting ideal that does not encapsulate the complexity of the lived experiences of women who have children.¹⁸³ Later feminist researchers also argued that the concept of 'good mothering' restricts women in their freedom of choice.^{149, 150} Gentile,¹⁸⁴ based on her exploration of media images from 2002 till 2010, found that in contemporary society motherhood is still defined as 'ultimate fulfilment'. In other words, it is still assumed that motherhood is a role that should fulfil women above anything else, that women should feel complete simply by being mothers, and therefore have no other desires such as careers, self-care and exercise. Within this research project it was of particular interest to explore how dominant ideology around what constitutes a 'good' mother(-to-be) influences women's physical activity behaviour. This knowledge provides opportunities for addressing such restrictive social structures in order to increase women's agency to engage in physical activity more freely.

In relation to the experience of pregnancy and the social construction of the 'good' mother-to-be, Gentile¹⁸⁴ showed how the media constructs pregnant women as vehicles for cultural anxiety. She argues that pregnancy can embody an ambivalent relationship to an unknown future that causes fear and anxiety, which explains why pregnancy is often a monitored and medicalised experience, and also explains why the media uses pregnant women as vehicles for ideas around how women should behave.^{184, 185} Medicalisation can be defined as a process in which "medical practice becomes a vehicle for eliminating or controlling problematic experiences that are defined as deviant (such as pregnancy and childbirth), for the purpose of securing adherence to social norms.¹⁸⁶ In the age of medical progress, scientific knowledge and medical answers are generally unquestioned as the best, most efficient, most legitimate solutions.¹⁸⁷ Since pregnancy can embody an ambivalent relationship to an unknown future that causes fear and anxiety,¹⁸⁴ society turns to the medical world to eliminate or reduce anxiety. In order to adhere to social norms, pregnant women are expected to see medical experts for monitoring purposes throughout pregnancy, and have a medically assisted childbirth. These notions around the social construction of the 'good' mother-to-be are interesting for this research project as

they provide an analytical tool for exploring how the act of physical activity is experienced by pregnant women within a society that controls and monitors pregnancy. This again provides opportunities for improving future intervention design to increase agency and physical activity among pregnant women.

2.2 Why a Determinant Analysis Preceded Implications for Intervention Design

Determinant analysis is defined by Hughes and Margetts⁸ as the analysis of the factors that contribute to the expression of a health problem. Implications for intervention design can be informed by numerous sources and methods of intelligence gathering and analysis, including review of determinants of the health behaviour under observation, review of previous interventions, or examination of experts' opinions.¹⁸⁸ This study included a three stage based determinant analysis that incorporated multiple methods in order to improve the understanding of the determinants of physical activity behaviour among pregnant and postnatal women:

- 1) A literature review: determinant analysis of physical activity in the general population and specific groups of women,
- 2) An intervention review to identify what theoretical perspectives and determinants were addressed by previous interventions, and
- 3) A longitudinal study on the determinants of physical activity during pregnancy and postpartum, women's lives and physical activity experiences, and how women give meaning to their physical activity experiences.

In the longitudinal study, the socio-ecological and feminist analysis informed the determinant analysis. In addition, the feminist analysis also explored how women give meaning to their physical activity experiences and to dominant ideologies around physical activity. The aim was to strengthen the determinant analysis by providing information on how social determinants and structures serve to reinforce dominant ideology and how they encumber physical activity during pregnancy and postpartum.

The triangulation of these three different methods aimed to ensure a comprehensive understanding of the determinants including their meaning and contexts, which can assist with critical reflection and improvement of existing health promotion strategies by negotiating mutual actions to improve those situations that women themselves would like to change.¹⁴⁶ Prior to developing suggestions for physical activity interventions, it is important to first have a comprehensive understanding of the problem and the determinants as leverage points for future intervention design.

2.3 Chapter Conclusion

In summary, this research has adopted pragmatism as the guiding paradigm, allowing focus on research questions rather than questions of epistemology and ontology. A multi-method design was used to provide different perspectives, to develop a comprehensive understanding of the determinants of physical activity during pregnancy and postpartum, and to understand how women give meaning to their physical activity experiences during this life phase. The author's position has been disclosed in relation to how this may have affected the results of the overall study.

Chapter 3. Methods

3.0 Introduction

Chapters 1 and 2 have addressed the purpose and justification of the overall study and outlined the different studies within this PhD. This chapter describes and justifies the methods specifically used for each study. These methods are discussed in the following sequence: 1) the temporal sequence of the overall study, 2) the literature review on the determinants of physical activity behaviour among women, 3) the intervention review, and 4) the longitudinal study.

3.1 The Temporal Sequence of the Overall Study

Three studies were conducted to understand: the changes in women's lives and physical activity behaviour; the determinants of physical activity during pregnancy and postpartum; how women give meaning to their physical activity experiences; and how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. This understanding was perceived as necessary to provide meaningful information that could improve future intervention design.

The first study consisted of a literature review on the determinants of physical activity behaviour in nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase, which informed both the determinant analysis and the longitudinal study. The results of this review are shown and discussed in Chapter 4.

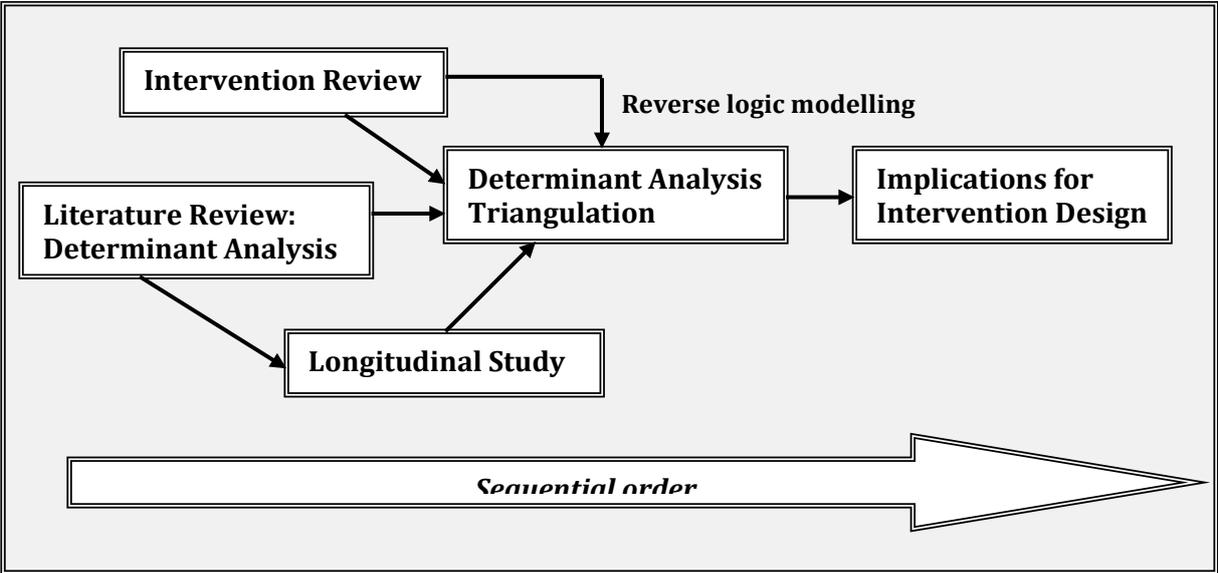
The second study consisted of an intervention review, which explored previous physical activity interventions that focused on nulliparous women, pregnant women, postnatal women and/or mothers past the postnatal phase. The intervention review also informed the determinant analysis. The results of this review are discussed in Chapter 5.

The third study comprised a longitudinal study, which focused on life and physical activity changes, and changes in physical activity determinants throughout pregnancy and the first three months of the postnatal period. This study also investigated how women give

meaning to their physical activity experiences and how these relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. The purpose of investigating how women give meaning to their physical activity experiences was to strengthen the determinant analysis by providing information about ways in which social determinants and structures serve to reinforce dominant ideology around health and how these encumber physical activity during pregnancy and postpartum. Life and physical activity changes were investigated to understand further contextual complexities that operate around and associate with the determinants of physical activity. The longitudinal study was based on the results of the literature review, described in the first study. The determinants that were found to be significant or had received limited investigation in previous physical activity studies among women, were further investigated within the longitudinal study in relation to pregnancy and postpartum among Sunshine Coast women. The findings of the longitudinal study are discussed in Chapters 7 and 8.

The determinant analysis triangulates findings from all 3 studies related to determinants influencing physical activity behaviour during the antenatal and postnatal period. This triangulation informs the discussion of the implications for intervention design, which can be viewed as the second outcome within this thesis. Figure 3.1 represents a schematic overview of the temporal sequence of all studies within this PhD.

Figure 3.1 *Temporal sequence of the research within this PhD*



For clarity purposes, the literature review on the determinants of physical activity will be referred to as the literature review and the determinant analysis triangulation will be referred to as determinant analysis from here on.

3.2 Study 1: Literature Review on the Determinants of Physical Activity among Women

This literature review was conducted to collate, categorise and discuss existing research into physical activity determinants among pregnant and postnatal women. Within the existing literature, review studies within the general population and empirical studies among women were identified, appraised, and synthesised.

The questions in this review are:

- 1) What is known about the determinants of physical activity behaviour among pregnant and postnatal women?
- 2) Does the significance of these determinants on physical activity behaviour change over time during pregnancy and the postnatal period?
- 3) Do the determinants differ compared to the determinants of physical activity in the general population, nulliparous women and mothers past 3 months postpartum?

3.2.1 Search Strategy

The initial search consisted of computerised searches of the databases Pubmed, Medline, Psycinfo for titles or abstracts that included combinations of words, and are represented in Appendix 2. The theories and their concepts used within this search have been widely used to explain physical activity behaviour.^{34, 45, 136-142} Additional studies were retrieved by scanning leading journals (e.g., Journal of Women & Health, American Journal of Preventive Medicine) in the field of physical activity promotion and by reviewing references cited in each of the eligible studies. This search strategy yielded 132 articles.

3.2.2 Inclusion and Exclusion Criteria

In regard to the empirical studies, the primary inclusion criterion for this review was that the publication under consideration had to identify the association between potential individual or environmental (social or physical) determinants (as described in the socio-ecological framework) and physical activity among nulliparous women, pregnant women, postnatal women and/or mothers past the postnatal phase. In addition, the study had to be published in English and within the period from January 2000 until December 2012 as findings of older studies may be less relevant to today's society.

With the aim being to inform implications for intervention design, an investigation of unchangeable demographic factors on physical activity behaviour was considered as irrelevant in the context of intervention design and was therefore excluded. In order to focus on healthy women in their childbearing years or with young children, studies that incorporated women with a certain condition and/or focused specifically on teenagers or women over 50 years of age were also excluded from detailed review. Studies focusing on both physical activity and nutrition were also excluded if the main focus was on diet or weight reduction. Studies that also included men were only reviewed when the determinants influencing women's physical activity behaviour were described separately.

Both quantitative and qualitative empirical studies were reviewed as it was important to identify significant correlations as well as women's perspective on barriers and enablers of physical activity behaviour in order to fully understand the problem as well as its contributing factors and possible effective intervention strategies. In order to identify which physical activity determinants need further investigation among pregnant and postnatal women, and to identify possible gender-specific determinants of physical activity, findings from empirical studies among women were compared with findings from review studies among the general population. Review papers that addressed the individual and/or environmental determinants of physical activity behaviour in the general population were included for this purpose.

3.2.3 Data Extraction

After applying the pre-specified inclusion and exclusion criteria 89 publications remained. No articles were rejected because of methodological limitations. The literature review on the determinants of physical activity among nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase consisted of 12 reviews and 77 empirical studies, which included 46 quantitative, 28 qualitative and 3 mixed methods studies.

All quantitative publications were entered into a database in which information about the study population, methodology, methods and findings were ordered. As qualitative studies emphasise knowledge gained by studying behavioural psychology or the complexities and contradictions of people's behaviour within their environment, they resist "summing up".¹⁸⁹ Therefore results of qualitative studies were used in order to provide data rich comments around the determinants addressed by quantitative studies.

3.2.4 Strengths and Limitations of the Literature Review

Studies included in this review used a wide variety of frameworks and theories, leading to overlap between certain concepts (e.g., between self-efficacy and behavioural control, outcome expectations and behavioural beliefs, knowledge and informational support, financial constraints and costs of exercise facilities and childcare). These concepts were integrated and reorganised according to the socio-ecological framework, in order to come to a comprehensive, well-structured and clear determinant analysis. This review identified a large number of potential studies obtained from literature searches in a wide range of databases, while acknowledging that many useful unpublished studies were left unidentified.

The heterogeneity in study samples, exposure and outcome measures included in this review as well as the inclusion of qualitative studies, meant that it was not possible to meta-analyse the results. However, the inclusion of qualitative and quantitative studies provides data rich information that is believed to improve the understanding of the determinants of physical activity behaviour among nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase.

3.3 Study 2: Intervention Review

A literature review was undertaken to identify previous effective intervention studies on physical activity among women. The aim of the intervention review was to identify the determinants of physical activity that were addressed within each study, and to identify the strategies that addressed those determinants.

The questions in this review are:

- 1) What determinants at an individual, social environmental and physical environmental level are addressed within effective intervention studies?
- 2) What intervention strategies are used to address these determinants in order to promote physical activity among women?

3.3.1 Intervention Review Process and Limitations

The combined determinants addressed within each intervention can be viewed as the intervention's logic model. Logic models are conceptual devices used in public health intervention design, planning and evaluation that make explicit the assumptions underpinning interventions. A logic model can be defined as "a diagrammatic representation of a program and provides a graphic depiction of the relationship between the main strategies of a program and associated goals, objectives, population(s) of interest, indicators and resources".¹⁹⁰ Logic models provide an overview of the overall structure and function of a program (i.e., the 'big picture'). As such, logic models are a useful resource for program planning. More specifically, logic models assist by demonstrating how a program's strategies contribute to the achievement of intended goals and objectives, and identifying gaps and inconsistencies within a program such as unmet objectives and non-contributing activities.¹⁹⁰

A retrospective and reductionist analysis of the causative assumptions applied in previous intervention research was used to explore determinants of physical activity from the perspective of previous interventionists (i.e., how previous interventionists have perceived the determinants of physical activity and informed their intervention design). It involves scrutiny and interpretation of published intervention goals and objectives, strategy mix and evaluation strategy, to help identify the determinants that the intervention is trying to change. Reviewing the determinants addressed within previous

intervention research, can assist in improving our understanding of physical activity related determinants in order to inform implications for intervention design.

The assumption made is that interventions can be easily broken down to identify determinants by scrutinising the strategy mix and stated objectives of an intervention. Goal statements typically focusing on the change in outcome expected (e.g., physical activity) whereas objectives typically are considered as statements about the changes expected in determinants. This assumption is clearly a limitation of this method as not all authors may adhere to this logic. In those cases, it comes down to logical interpretation based on available information derived from those intervention studies, reducing its validity and reliability. Nevertheless, a lot can be learned from this method as it provides the potential to add value, resulting in a better informed determinant analysis compared to a conventional literature review only based determinant analysis.

3.3.2 Search Methods for Identification of Studies

The initial search consisted of computerised searches of databases including Pubmed, Medline and PsychInfo. Keywords used in various combinations included *intervention, program, programme, course, physical activity, physically active, active, exercise, pregnant, pregnancy, antenatal, antepartum, postnatal, postpartum, maternal, mothers and women*. References cited in each of the eligible studies were reviewed as well. This search yielded 245 publications.

3.3.3 Inclusion and Exclusion Criteria

Increasing physical activity behaviour in women had to be the main focus of the intervention. In addition, the minimum intervention duration and follow-up period was 4 weeks. The logic behind this decision is because this review aimed to not only identify which interventions were successful in bringing about an initial increase in physical activity behaviour, but also whether the intervention was successful in keeping women active for at least 4 weeks. The intervention's loss to follow-up could not exceed 20% as a higher percentage may indicate that the intervention was only successful in increasing physical activity among women who were motivated at baseline. Only English

publications within the time period from January 2000 until December 2012 were included as findings of older studies may be less relevant to today's society. This time period was also believed to retrieve a sufficient amount of studies. It is also important to note that many physical activity interventions for pregnant women and mothers have been conducted (including in Australia), but are located in the grey literature. The grey literature was excluded from review as unpublished articles either (a) have not passed peer review, and are of questionable scientific and evaluative quality, or (b) have not undergone peer review at all, so their quality has not been assessed.¹⁹¹

As this review aimed to inform implications for intervention design among Sunshine Coast antenatal and postnatal women, inclusion criteria for participants were set as well. Participants had to be women who were at least 18 years of age, in their reproductive years, non-obese or any other pre-existing medical conditions that may limit participation in physical activity. Interventions focusing on specific non-Caucasian ethnicities such as African-American or Latin-American women, or trained athletes were excluded. After the publications, yielded during the initial search, were examined for the inclusion and exclusion criteria, 20 studies remained.

3.3.4 Data Extraction and Synthesis

Twenty studies were considered relevant for this review. For each study the following information was recorded using a standardised study extraction form: 1) publication citation, 2) description of study participants, 3) study objective as described by the authors, 4) physical activity related measures, 5) determinants addressed within the intervention, and 6) physical activity related results. These study characteristics are presented in Appendix 3. The results of the review were organised by using the socio-ecological framework. The objective of this analysis was to identify the determinants at an individual, social and physical environment that were addressed in previous interventions. Since the objective was not to distinguish in terms of interventions' effectiveness or validity, a quality assessment of the intervention studies under observation was not carried out.

3.4 Study 3: A Longitudinal Qualitative Study

As was indicated in Chapter 1 and explained in further detail in Chapter 4, a major deficiency in existing published research is the lack of longitudinal peer-reviewed studies in physical activity promotion among pregnant and postnatal women. Therefore a longitudinal study was conducted on the Sunshine Coast in Australia between 2009 and 2012. This aimed to understand the determinants of physical activity among antenatal and postnatal women, in order to inform the development of public health interventions that promote the recommended 30 minutes of moderate intensity physical activity on at least 5 days per week.^{64, 65} Since the longitudinal study comprises the major part of this research project this section will provide a detailed justification for the chosen methods, discusses the study aims, research questions and the design of the study including ethical considerations, and explains sample selection and recruitment, data collection and data analysis.

3.4.1 Qualitative Research

A qualitative approach was taken in regard to the longitudinal study in order to explore the lived experiences of pregnant women and mothers in regard to physical activity behaviour. Qualitative research takes an interpretive, naturalistic approach to its subject matter. This means that phenomena are studied in their natural settings and attempts are made to make sense of or interpret phenomena in terms of the meanings that people attach to them.¹⁹² Qualitative research acknowledges that there are many different ways of making sense of the world and aims to discover and understand the views of and how meaning is created by those who are being researched rather than the views of the researcher.¹⁹³

This qualitative longitudinal research investigates and interprets changes that have taken place over time, and what and how certain processes are formed in social contexts.¹⁹⁴ Qualitative longitudinal research represents a range of mainly in-depth interview-based studies, which entail returning to interviewees to explore changes that occur over time and associated processes within these changes. There is a growing interest and involvement in qualitative research methods in social sciences, and among policy makers,

who can see that statistical methods can give them answers to “what” questions, but leave them in relative darkness about “why” and “how”.¹⁹⁴

Although quantitative surveys have provided valuable information about women’s physical activity patterns, they offer limited insights into the various meanings and contexts within which physical activity habits are framed.¹⁹⁵ Since not much is known about what determinants influence physical activity behaviour in Australian antenatal and postnatal women, a qualitative approach was preferred. The aim was to explore determinants, to improve understanding of how and why these determinants influence physical activity during the pregnancy and the first three postnatal months in order to inform implications for intervention design.

3.4.2 Aim & Research Questions of the Longitudinal Study

The purpose of this longitudinal study was to explore the lived experiences of women throughout pregnancy up until 3 months postpartum, living on the Sunshine Coast of Queensland, Australia, in order to more fully understand the determinants of physical activity. This knowledge was used to inform implications for intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and after childbirth. The research questions in this study were:

- 1) What part does physical activity play in women’s lives and how do their lives and physical activity behaviours change throughout pregnancy and the first three postnatal months?
- 2) How do individual, social environmental and physical environmental determinants influence women’s physical activity behaviour throughout pregnancy and the first three postnatal months?
- 3) How do women give meaning to their physical activity experiences in everyday life throughout pregnancy and the first three postnatal months?
- 4) What are the implications for future intervention design in order to promote and sustain appropriate physical activity throughout the antenatal and postnatal phase?

3.4.3 Design

This longitudinal study commenced with individual, semi-structured, in-depth telephone interviews among a cohort of pregnant women between 10 and 19 weeks gestation. Participants were followed up until 3 months postpartum. Interviews were built on a naturalistic, interpretive philosophy, conducted as extensions of ordinary conversations, and interviewees were seen as partners in the research enterprise rather than subjects to be tested.¹⁹⁶ The interview method enabled the formation of a relationship with each woman who participated in the study. In order to minimise the power difference between interviewer and interviewee, women were told previous to every interview that the aim of the study is to understand, not to judge them.

3.4.4 Ethical Considerations

The National Health and Medical Research Council (NHMRC) guidelines on ethical conduct in human research¹⁹⁷ were considered in the design of the study. It outlines four fundamental ethical principles to guide research: 1) Research merit and integrity, 2) Justice, 3) Beneficence, and 4) Respect. The guidelines were closely followed in relation to qualitative methods and pregnant women.¹⁹⁷ These values and principles were considered in this study by ensuring that:

- 1) the research had significant merit and that research was conducted with integrity,
- 2) the process of recruitment was fair,
- 3) there was no unfair burden on or exploitation of participants,
- 4) no harm came to participants and that participants were treated with respect,
- 5) the wellbeing and care of the pregnant woman and of her fetus always took precedence over research considerations,
- 6) participants had the right to withdraw from the study at any time, and
- 7) no names or identifying data were used in the reporting of the findings.

The following strategies were used to ensure the recruitment process was fair and there was no unfair burden or exploitation of participants:

- Women were recruited via the antenatal clinic when they came in for their first appointment and informed about the study while they were waiting to see the midwife.
- The researcher would only discuss the study and possible participation if the patient showed interest by approaching the researcher.
- Interviews were conducted by phone to reduce the participation burden
- Participants selected a day and time for each interview that would suit them best and were informed that the interview could be easily rescheduled if it no longer suited their agenda.

The following strategies were used to ensure that no harm came to participants, that participants were treated with respect, and that the wellbeing and care of the pregnant woman and of her fetus always took precedence over research considerations:

- Telephone interviews enabled women to pick a time and location for the conversation that they felt most comfortable with.
- Women were informed at the start of the interview that the goal of the interviews was to understand, not to judge them. Women were also informed that if they did not wish to answer a certain question, they could express this freely.
- Throughout every interview, if women expressed feelings of embarrassed about not being active, or not having followed through their intention to become more active, the interviewer would show understanding and compassion and would tell them not to feel guilty or embarrassed and would remind them that the study was about understanding their experiences and struggles, not to judge them.
- When women would discuss stressful situations, hardships or personal relationships, women were asked whether they were okay with discussing this. When such issues were discussed, the interviewer would show compassion and understanding.
- The researcher also ensured that the findings reflected respect and understanding towards the participants, their lives and experiences.

In addition, when informing the potential participants at the antenatal clinic, women were informed that they had the right to withdraw from the study at any time, and no names or identifying data would be used in the reporting of the findings.

Ethics approval was granted by the District Human Research Ethics Committee (Appendix 4). Information sheets and consent forms (Appendix 5 and 6) were used for recruitment purposes. These forms detailed the outline and aim of the study.

3.4.5 Sample Selection and Recruitment

Qualitative studies of women and physical activity have typically relied upon convenience samples and consequently have mainly represented the views of middle-class, white, married women.^{112, 146} One of the aims of the current study was to address this imbalance by recruiting a wider range of informants. A purposive sampling strategy^{198, 199} was chosen to ensure that the broad range of different experiences and perceptions was identified rather than to draw conclusions regarding generalisable results. Participants were recruited through the antenatal clinic of a major public regional hospital. At the time of the study, this hospital delivered 59% of all births²⁰⁰ on the Sunshine Coast. A public hospital was chosen instead of a private facility to ensure women of lower socio-economic status were well presented as they are at a greater risk of physical inactivity compared to high socio-economic status women.^{201, 202}

Recruitment days for the longitudinal interview-based study were selected based on the antenatal clinic's appointment schedule. Women were eligible to be recruited if they were at least 18 years of age, not highly dependent on medical care, at the end of the first trimester or between 13-19 weeks gestation, and able to understand, speak and read English. All eligible women who came into the antenatal clinic to visit their midwife on recruitment days were made aware of the presence of the researcher and the research topic, and were informed that if they wanted, they could discuss possible participation in this study with her. During the discussion, women were provided with an information sheet detailing the outline and aims of the study. If women agreed to participate in the study, signed consent was obtained and appointments for the first phone interview were made. A copy of the interview questions was provided to participants in preparation for the interview.

Face-to-face recruitment was preferred over anonymous or disengaged recruitment methods as initial personal contact between the researcher and participants was

considered to enhance recruitment and the quality of the interviews, and to reduce attrition during the study. It was believed that face-to-face recruitment would leave more room to explain the relevance of the research, how it would benefit future pregnant women (to appeal to their altruistic nature) and to explain that phone interview appointments would be made to suit their schedule, which may result in more successful recruitment.²⁰³ It was also believed that for interview purposes, women would feel more comfortable to talk and open up to someone they had previously met rather than a complete stranger. This recruitment approach was believed to improve the relationship between the interviewer and interviewee and therefore the quality of the interview. Recruitment and data collection continued until the diversity of experiences was identified and understood.²⁰⁴ The sample characteristics are presented in Chapter 6, Table 6.1.

3.4.6 Data Collection: Interviews

Based on the previously discussed literature review on the determinants of physical activity among nulliparous, pregnant women and mothers, an interview protocol involving open-ended questions was developed to explore women's reflections on recent physical activity experiences during pregnancy and postpartum (see Table 3.1). Social capital was added in the postnatal interviews. The hypothesis was that the more connected women feel with the people in their neighbourhood, the more likely it is for women feel safe and at ease when outside with their new born baby.

Interviews of an approximate duration of 45 minutes were audio taped and conducted by telephone, with all women who provided written informed consent, a few days after recruitment. Women were interviewed directly after recruitment, at the end of the second and third trimester, and three months after childbirth. The questions in every interview were worded retrospectively in order to explore women's lived experiences in the last three months. Interviewees were informed they did not have to answer the question if they did not want to. In addition, experiences were shared and explicit understanding and compassion was shown when women deviated from the felt "socially desirable answer" in regard to insufficient physical activity. Member checking²⁰⁵ took place throughout each interview as part of a process of error reduction.²⁰⁶

The interview protocol was pilot tested among a sample of six women meeting the inclusion criteria. The pilot investigated question ambiguity, sequencing and flow of questions and identified possible points for probing. Questions focused on changes in physical activity behaviour, general barriers and enablers, individual factors, social and physical environmental factors influencing physical activity behaviour and intervention suggestions (Appendix 7). For the purposes of this study, physical activity was defined for participants as any movement of their body that results in using energy.¹⁵ It includes incidental activities (walking to shops, housework, gardening, etc.), recreational activities (swimming, walking, cycling, running and yoga), organised sports/member of a sports club (team sports, athletics, swimming) and has different intensities ranging from low to vigorous intensity.

Table 3.1 *Interview key themes and rationale*

<u>Key theme of the question</u>	<u>Rationale</u>
1. Life changes	To obtain an overview of the life changes during pregnancy and postpartum that may influence women's PA behaviour
2. PA changes	To obtain an overview of the changes in PA behaviour during pregnancy and postpartum
3. General barriers and enablers of PA	It was desired to start with a inductive approach before focusing on theory driven determinants
4. Intention towards PA	To assess whether participants had the intention to increase, maintain or decrease their physical activity behaviour
5. Attitude towards PA	To assess whether women perceived PA as enjoyable, important and beneficial physical and mental health
6. Knowledge regarding PA guidelines and benefits	To determine whether women were aware of the guidelines and benefits of PA
7. Concerns about being active	To assess whether women perceived PA as something that is harmful and can cause a miscarriage, and how these concerns impacted their PA behaviour
8. Outcome expectations in relation to PA	To determine women's opinion regarding the effect of PA on their mental and physical health and the foetus' health
9. Motivation to be physically active	To establish the level of PA motivation and what influenced their level of motivation
10. PA priority	To determine whether being active was perceived as a priority and why

11. PA self-efficacy	To assess how confident women felt regarding maintaining or increasing current PA habits and towards meeting the pregnancy and postpartum specific PA recommendations
12. Normative beliefs regarding PA	To examine women's beliefs about the opinions of people close to them regarding PA during pregnancy and postpartum and whether their opinion impacted women's PA behaviour
13. Social support for PA	To assess how much emotional, informational, instrumental and belonging support women received and whether that helped them to be physically active
14. Social cohesion and social capital in the postnatal period	To assess how connected women felt with their community and whether this impacted their postnatal PA behaviour
15. Neighbourhood's PA friendliness	To examine what physical environmental factors facilitated or encumbered women's PA behaviour
16. Preferred interventions in terms of information, programs and facilities	To assess what would motivate and support women to be physically active during and after pregnancy

PA = Physical activity

Individual interviews were preferred over focus groups to ensure that even the women who are harder to reach (e.g., working women, women in caregiver roles,²⁰⁷⁻²⁰⁹ women who experience social or geographic isolation, and women who lack transportation and/or childcare) were well represented, which would reduce selection bias.¹¹² Telephone interviews were preferred over face-to-face interviews as the flexibility associated with telephone interviewing was highly valued by women in the pilot interviews and was therefore expected to reduce initial refusal and attrition later on.²¹⁰ Telephone interviews were preferred over mail questionnaires as the rate of missing responses is usually higher for mail,²¹¹ and telephone interviews provide the researcher with the opportunity for further probing when needed.

3.4.7 Data Analysis

The demographic characteristics of the sample were compared with available Sunshine Coast prenatal data^{212, 213} to speculate in relation to generalisation. The recorded interviews were professionally transcribed by SmartDocs Australia and participants'

names were changed to pseudonyms. The transcriptions were checked for accuracy²¹⁴ and cleansed from transfer errors via “corrective listening”.²¹⁵ The data were organised, coded and analysed using the software package NVivo8. The data related to life and physical activity changes throughout pregnancy and the first three postnatal months were analysed for patterns and themes that explained potential changes. These results are discussed in Chapter 6.

The data analysis related to explaining women’s physical activity behaviour during pregnancy and postpartum consisted of two stages: a socio-ecological and feminist analysis. The first stage of analysis can be viewed as the descriptive phase of the analysis, during which interview transcripts were coded, organised and categorised using the socio-ecological framework and key themes in the interview protocol (see Table 3.1), and then scanned for common themes and patterns.^{216, 217} Preliminary analysis occurred alongside with data collection and codes were continually adjusted and restructured as data collection and analysis progressed.²¹⁸ The socio-ecological analysis is further described in section 3.4.7.1 and the results of this analysis are discussed in Chapter 7.

Themes that emerged from the socio-ecological analysis were then re-analysed using a feminist standpoint lens,¹⁵⁵ which comprised the second level of analysis. This feminist analysis focused on the deeper meaning of the themes that emerged out of the data during the first level of analysis and how this meaning was socially constructed. It was used to deepen the understanding of women’s experience of physical activity and what it meant to them in relation to their wellbeing, their family’s wellbeing and other areas in their life. Section 3.4.7.2 further describes the feminist analysis and the results of this analysis are discussed in Chapter 8.

The socio ecological analysis aimed to answer research question two (see Chapter 3, section 3.3.2), the feminist analysis aimed to answer research question three, and both types of analyses informed the implications for intervention design, which was the fourth and final research question. Comments from participants were included in the presentation of the results to support the analysis and findings. These quotes include information about women’s physical activity levels. ‘Active’ refers to meeting the physical activity recommendation of 30 minutes of moderate physical activity on at least 5 days

per week.⁶⁴ 'Insufficiently active' therefore means not meeting this physical activity recommendation.

3.4.7.1 First level: Socio-Ecological Analysis

Data were organised by using the socio-ecological model (individual, social and physical environment) in order to frame what and how determinants at different levels influenced women's physical activity behaviour and how this changed over time during pregnancy and the first 3 postnatal months. After the data were organised into categories, the coding process commenced. Data were analysed thematically and through constant comparison²¹⁹ in that the content elicited from the data were categorised, put into themes, and constantly compared with what was collected earlier to produce concepts grounded in the data.

The constant comparative method (CCM) is a process in which theory is generated by systematic joint coding and analysis.²²⁰ The CCM can be described in four stages: 1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the theory, and 4) writing the theory.²²⁰ The analyst started by coding each incident in the data set in as many categories of analysis as possible. While coding an incident for a category, a comparison was made with the previous incidents coded in the same category. The second step involves focusing on the important properties within each category and on integrating categories or certain properties of several categories. Through constant comparison, the theory developed as different categories and their properties became integrated. This delimiting phase occurred both at a theory level and category level. At the end of the process, data were coded and a series of memos and a theory were developed with the categories being the major themes of the theory. Extracts from transcripts were included to provide "the voice of the participants".²²⁰

Although the CCM is most often associated with the methodology of grounded theory developed by Glaser and Strauss,²²¹ it also readily transportable to other styles of qualitative research,²²² such as this study. The longitudinal study was partly inductive and deductive. It was deductive in that the interview protocol included questions about

determinants that have previously shown to be significant in modifying physical activity behaviour among women such as self-efficacy or behavioural control.^{87, 223-230} The inductive aspect of this study can be found in the first part of the interview protocol which was unstructured and focused on barriers and enablers of physical activity mentioned spontaneously by participants when asking about things that had limited or facilitated their physical activity behaviour. It can therefore be concluded that although some pre-categorisation was made before data collection (see Table 3.1), further categorisation and themes emerged out of the data. Counting techniques were used as they are effective “as an initial mean of obtaining a sense of the variance in the data” and at a later stage when themes have been identified, for their prevalence.²³¹ These counts provide a very rough estimate of relative importance and have the potential to reveal general patterns in the data.²³² Finally, deviant case analysis²⁰⁶ was practised throughout the process of analysis and reporting in that alternative explanations for the data collected or elements in the data that seem to contradict the emerging explanation of the phenomena under study were explored and discussed.

3.4.7.2 Second Level: Feminist Analysis

This second stage of analysis consisted of a feminist analysis in which a feminist standpoint perspective¹⁵⁵ was adopted to interpret and give meaning to the existing coding structures, created during the socio ecological analysis. This type of analysis was chosen in order to explore how women give meaning to their physical activity experiences in their everyday lives during the antenatal and postnatal phase (see third research question, section 3.4.2). The aims of the feminist analysis in this thesis followed three aims in line with a general feminist approach (as discussed in Chapter 2, section 2.1.3), and followed three more specific aims in line with feminist standpoint epistemology. The feminist analysis aimed to: 1) reveal hidden and unrecognised research areas, 2) identify how women may conform to, resist, transgress or negotiate mainstream messages in society, 3) identify women’s demonstrations of double consciousness, 4) identify the close interplay between social and biological factors (e.g. the interplay between the interplay between sex, gender and social expectations), 5) understand how women’s knowledge is socially situated, and 6) inform future

intervention design in ways to increase agency among marginalised groups, leading to empowerment and social change.

Existing coding structures created during the socio-ecological analysis were further developed according to the dialectic method. Modern dialectics as developed by Hegel²³³ refers to the unity and struggle of opposites in all things co-existing. It goes further than the acknowledgement that there is a hidden harmony in nature and a unity of opposites (e.g., mother and child as the carer and the cared for). It considers the opposites and the contradictory in their unity, and not as being mutually exclusive. This means that in every theme or concept opposites and contradictions can be found and it is exactly that contradiction and opposition that forms its unity. Using this deeper feminist level of analysis, themes were identified in which struggles, tensions and paradoxes were described, and also how these co-existed in a non-dualistic manner. The analysis aimed to identify struggles, tensions and paradoxes within the individual and within the social and physical environment.

Existing coding structures and the original transcripts were further investigated according to the aims of the analysis. Data were analysed thematically and through constant comparison²¹⁹ in that the content elicited from the data were categorised, put into themes, and constantly compared with what was collected earlier to produce concepts grounded in the data. For example, transcripts were explored to identify possible unrecognised research areas, dominant views and/or resistance towards such ideology, and were coded as such. In order to identify displays of double consciousness, transcripts were investigated for where women discussed their own perceptions and experience in relation to dominant ideology. Transcript sections where women discussed intervention suggestions that could empower them to change their physical activity behaviour were also coded as such. Transcripts were explored for tensions, paradoxes, and for conformation, resistance, transgression and negotiation in relation to dominant views in their social environment. During this exploration, the researcher was consciously letting the themes emerge out of the data rather than looking for certain themes within the data, based on previously acquired knowledge and experiences. As coding of the transcripts progressed, tensions in women's everyday practices became apparent. Analysis of these tensions was built on previous theoretical and critical perspectives on

key issues of concern to women, including dominant ideology around pregnancy, motherhood, breastfeeding, health and the body.^{112, 146, 149, 150, 181-183, 234-238}

3.4.8 Limitations of the Longitudinal Study

This study was qualitative, undertaken with a particular group of women who were purposively sampled, and analysed using a socio-ecological and feminist approach. The findings are therefore not generalisable. Nonetheless, the detailed exploration helps to illuminate aspects about the experience of physical activity during pregnancy and postpartum that previously may not have been fully acknowledged.

Although only a small sample size (n=30) was recruited, this sample consisted of a wide range of ages, income, education, marital status, and included both multigravidas and primigravidas. This resulted in a wide range of physical activity experiences and experienced facilitators and barriers of physical activity. In addition, the small sample size was not perceived as a limitation as the aim of the study was to develop in a depth understanding, rather than to generalise.

Women were recruited at a public regional hospital, which made it more likely to include women of lower socio-economic status. However, when comparing the demographic characteristics of the sample with available Sunshine Coast prenatal data,^{212, 213} no significant differences were found (see Table 6.1). In addition, women lived in various Coastal and hinterland areas on the Sunshine Coast, of which many were born on the Sunshine Coast. These findings may therefore only relate to a Sunshine Coast culture and findings should therefore be interpreted with caution in terms of generalisability to other areas within or areas outside of Queensland.

Women were interviewed after recruitment at 10-19 weeks gestation, at the end of the second and third trimester and after three months postpartum. Women therefore reflected on current, but also on previous months within the time period of focus (1st, 2nd, 3rd trimester or first 3 postnatal months). This means that participants also had to rely on their memory regarding their experiences 2-3 months ago. Recall bias must therefore be considered when interpreting these results.

Another limitation is that this study did not include quantitative methods. Although some researchers may still believe qualitative research cannot make any statements regarding causality, the view that qualitative research methods, especially longitudinal design, can be used to develop causal explanations is now accepted by a significant number of both qualitative and quantitative researchers.²³⁹

In addition, social capital was only explored during the postnatal stage, which can be viewed as a limitation of this study. Social capital was not explored as a determinant of physical activity during pregnancy, because a tool to measure social capital in a qualitative manner was not identified until after the data collection in relation to the third trimester.

As a final note in relation to the limitations of this study, the first and second rounds of interviews were conducted in the summer when the Sunshine Coast was experiencing remarkably heavy rainfall, high humidity, and major floods. Weather conditions may therefore have influenced women's physical activity behaviour more than if the study was conducted in a different season or year.

3.5 Methodological Triangulation

Triangulation is typically a strategy for improving the validity and reliability of research or evaluation of findings.²⁴⁰ Methodological triangulation strengthens a study by combining methods and comparing the results from either two or more different methods of data collection.¹⁰³ The aim is to investigate patterns of convergence in order to develop or corroborate an overall interpretation.¹⁰³ However, it has previously been stated that it is controversial as a genuine test of validity because it assumes that any weaknesses in one method will be compensated by strengths in another. Triangulation may therefore be better seen as a way of ensuring comprehensiveness and encouraging a more reflexive analysis of the data rather than a pure test of validity.²⁰⁶

Within this study, multiple methods (i.e., literature review, intervention review, and longitudinal study) have been used in order to strengthen the study and ensure a

comprehensive understanding of the determinants of physical activity during pregnancy and postpartum as described.

3.6 Chapter Conclusion

In summary, a triangulation of three methods (i.e., literature review, intervention review and longitudinal study) was used to develop a comprehensive determinant analysis of physical activity behaviour during the antenatal and postnatal period. The longitudinal study involved interviews at four intervals (1st, 2nd, 3rd trimester, and 3 months postpartum) and was subjected to a dual qualitative analysis: socio-ecological and feminist. The socio-ecological analysis aimed to explore the determinants at an individual, social and physical environmental level. The feminist analysis aimed to explore how women give meaning to their physical activity experiences in everyday life during pregnancy and postpartum, including how these relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. This comprehensive determinant analysis was used to inform the discussion of the implications for intervention design.

Chapter 4. Literature review

4.0 Introduction

This literature review discusses the determinants of physical activity identified in the literature according to their level of impact; individual, social environmental or physical environmental level. The categorisation of determinants using the socio-ecological approach aims to facilitate the identification and understanding of high leverage points for physical activity intervention design. This review therefore contributes to the second research question: How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy and the first three postnatal months?, and also contributes to the fourth research question: What are the implications for future intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and the first three postnatal months? A comprehensive answer to the second and fourth research question is provided in Chapter 9.

In this literature review, both review studies and empirical research were included. The reviews focused on adult population based studies, while the empirical studies described the relationship of the determinants with physical activity behaviour among nulliparous women, pregnant and postnatal women, and mothers. In order to identify possible gender-specific determinants of physical activity, findings from empirical studies among women are compared with findings from review studies among the general population. Other possible gaps are identified in terms of methods and geography (i.e., which determinants need further investigation among Queensland women to provide local population context and how these should be investigated). If there was a significant amount of quantitative and qualitative research in relation to a certain determinant in relation to physical activity behaviour among women, quantitative and qualitative findings were discussed separately in order to indicate, where possible, whether the identified determinants in the qualitative studies were also found to be significant in quantitative studies.

4.1 Individual Determinants of Physical Activity

The literature identifies multiple determinants that have an impact on physical activity behaviour at an individual level, including: attitude; intention; motivation; knowledge; self-efficacy; sickness, tiredness and physical discomfort; priority; and body-image and self-esteem. Table 4.1 lists identified individual determinants at general population, women and mothers and pregnant women sub-population levels, which are discussed in turn.

Table 4.1 *Individual level determinants of physical activity behaviour*

Determinants	General population	Women and mothers	Pregnant women
Attitude:			
<i>Positive & negative attitudes</i>	241-243	87, 93, 112, 238, 244-259	87, 104, 105, 248, 252, 260-274
<i>Attitudes towards specific activities</i>			269
Intention	243	87, 243, 251, 258, 275	87, 260-263
Motivation:	241	225-227, 245, 248, 250, 254, 276-282	104, 105, 248, 265, 268-270, 283
<i>Intrinsic motives:</i>			
<i>Enjoyment</i>	242	247, 252, 255, 275, 280	105, 252, 268, 274
<i>Social interaction</i>	242	245, 280, 284, 285	104, 264
<i>Achievement and personal satisfaction</i>	242	255, 280	269
<i>To improve mood, stress relief and to 'get out of the house'</i>	242	112, 225, 238, 246, 255, 280, 285-289	104, 105, 260, 265
<i>Challenge and skill development</i>	242		
<i>Part of their identity and routine</i>	241, 242	238, 247, 253, 264, 275, 290	105, 265, 269
<i>Extrinsic motives:</i>			
<i>Appearance (e.g., weight regulation, weight loss, or 'defined' look)</i>	242	105, 225, 238, 246, 252, 286	104, 105, 252, 269

Knowledge	241	244, 253, 264, 282, 291	268, 270, 291, 292
Self-efficacy	30, 241-243	87, 223-230, 250, 251, 258, 259, 275, 276, 282, 293, 294	87, 260-263, 274, 283, 295, 296
Sickness, tiredness and physical discomfort		87, 93, 225, 227, 245-247, 252, 264, 276-279, 281, 284, 296, 297	87, 104, 105, 248, 252, 265, 268, 269, 283, 292, 297, 298
Priority:		282, 288	270
<i>Prioritising one's children and family above oneself</i>		112, 247, 249, 252, 254, 256, 264, 279, 284, 290	252
Body image & Self-esteem		112, 238, 247, 254, 255, 264, 278, 282, 290, 299	291

Note: The numbers refer to research papers, which can be found in the reference list, PA= Physical activity

4.1.1 Attitude

In the context of physical activity, attitude can be defined as the combination of physical activity beliefs and judgments about the value of each expected outcome of physical activity⁴. Physical activity beliefs refer to an individual's beliefs about the consequences of physical activity. Attitude is embedded in the theory of planned behaviour and is based on the subjective probability that the behaviour will produce a given outcome⁴. This review identified positive and negative behavioural beliefs towards physical activity among women, and attitudes towards specific activities during pregnancy.

4.1.1.1 Positive and Negative Physical Activity Beliefs

Physical activity is generally appreciated as being beneficial for wellbeing.²⁴¹⁻²⁴³ Nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase also hold positive attitudes towards the benefits of physical activity. Wen et al²⁸⁸ suggested that short term benefits, such as reduced stress, feeling younger and feeling more able to cope with their busy lives, were the most salient benefits among women, not the long term benefits that are commonly reported in physical activity campaigns, such as weight regulation. However, beliefs about physical activity are not always positive, and negative beliefs may be barriers to physical activity participation. Table 4.2 summarises the negative and positive attitudes identified in the literature.

Table 4.2 *Summary: positive and negative physical activity beliefs among women*

Positive attitudes	Source
PA is related to improved physical health such as improved muscle strength, muscle tone, flexibility, improved fitness, reduced lower back pain, weight regulation, more energy, and helps with treating type 2 diabetes	87, 93, 104, 105, 112, 238, 244-255, 259-270, 272, 282
PA has a positive effect on the foetus' health and development	104
PA leads to positive psychological outcomes such as improved wellbeing, mood, better sleep, stress relief, light heartedness, happiness, energy levels, self-esteem and body image. PA also leads to positive social outcome such as the development of social networks	87, 93, 104, 105, 112, 238, 244-255, 260-270, 272, 282, 288
PA assist with labour and preventing complications during pregnancy and labour	104, 260
PA increases women's ability to carry the added weight and deal with other bodily changes during pregnancy	104
PA provides women with alone time	286
PA could potentially improve parenting practices	245
Negative attitudes	Source
PA is not enjoyable	93, 246, 264
PA involves too much hard work, is tiring and takes too much time	87, 286
Having no physical talent for sports and not being able to keep up with others in group classes	247
Most PA is not appropriate for women, only for men	247
PA during pregnancy should be limited and intensity reduced due to risks of PA during pregnancy	246, 270-272
PA during pregnancy presents an inherent risk to own health (e.g., increase in falls or muscular strain) and the baby's health (e.g., miscarriage and premature birth physical development)	105, 248, 268-270
Fears regarding risks were most prominent among women who had received fertility treatment, previously had miscarried or knew women who had miscarried	269
Sense of guilt when considering to engage in leisure activity without their children or when considering to put own needs before the needs of their family	112, 238, 282, 284
Mexican women considered PA as selfish, because caring for others was perceived as a woman's primary role, and a good mother is not selfish	250
Mexican women expressed that own thoughts in relation to PA were not considered important; husband's and family's beliefs were more important for married women and mothers	244
Aboriginal women expressed feeling embarrassed due to the minimal clothing required when engaging in activities other than walking	257

PA= Physical activity

In regard to safety beliefs, Evenson et al²⁴⁶ found that participants who received health professional advice on physical activity during the postnatal period were more likely to agree that increasing physical activity or exercise was safe compared with those who had not received advice. This emphasises the important role of health professionals in regard to women's attitudes towards physical activity. The influence of health professionals is discussed in more detail in Chapter 4, section 4.2.1.2.

Positive and negative physical activity beliefs are heavily influenced by social norms, which are culturally sensitive. Understanding these social norms in relation to physical activity within the observed community is important to ensure negative beliefs in relation to physical activity are addressed with social norm sensitive intervention strategies.

4.1.1.2 Attitude towards Specific Activities during Pregnancy

It is believed that understanding women's attitude towards certain types of physical activity can inform our understanding of the type of physical activity exposure most likely to be engaged in by certain groups of women. Only one study was identified that attempted to improve this understanding. Hegaard et al²⁶⁹ found that yoga and swimming were especially experienced as enjoyable throughout pregnancy.²⁶⁹ Yoga was also experienced as relaxing and meditative. Swimming was experienced as the most satisfying type of physical activity, because it was an unburdened and weightless activity, and was experienced to alleviate oedema in the legs via improve blood circulation.²⁶⁹ However, at the end of pregnancy swimming was also reported as uncomfortable, especially after getting out of the water as women went from feeling weightless to having to carry their full weight again.²⁶⁹ Some women enjoyed jogging throughout pregnancy, but there were also women who did not share this experience. Women who did strength training described this as "wonderful".²⁶⁹

4.1.1.3 Quantitative Evidence: Impact of Attitude on Physical Activity

The findings from quantitative studies suggest that there is inconsistent evidence in relation to the impact of attitude on physical activity behaviour. Table 4.3 summarises the

key findings from the literature on the impact of attitude on women's physical activity behaviour.

Table 4.3 *Quantitative evidence on the impact of attitudes on physical activity among women*

Evidence	Source
Attitude towards PA was one of the most significant predictors of PA among African- American women	258
Non-participation in moderate or vigorous PA were associated with increased odds of feeling unsure or unsafe regarding PA during pregnancy	266
Women with a greater belief that low to moderate intensity PA during pregnancy is unsafe were less active and were more likely to be active at a lower intensity at the end of the second and during the third trimester	105
The belief that PA improves parenting practices was positively correlated with PA behaviour, while the belief that PA interferes with other commitments was found to correlated negatively with PA behaviour among mothers	245
A significantly positive correlation was found between a woman's beliefs regarding the benefits of antenatal PA and PA behaviour during pregnancy	273
Women who enjoyed walking, were more likely to engage in recommended levels of leisure-time PA	275
Among pregnant women, enjoyment of PA was a strong correlate of any activity, any recreational activity and high volume recreational activity	274
Attitude did not have a direct effect on PA behaviour among nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase. Attitude only had a significantly positive correlation with PA intention	87, 243, 262, 263
There was no significant association found between feelings of guilt towards PA participation and PA behaviour among women	256
Beliefs around severity, vulnerability, fear, and whether regular PA is important for disease prevention, did not predict whether women with or without young children were active	251

PA= Physical activity

From the findings in the literature, it can be concluded that the influence of overall attitude on women's physical activity behaviour is unclear and therefore needs further investigation. Findings related to guilt as a barrier to mothers' physical activity behaviour also needs further research. However, beliefs related to safety concerns, priorities and benefits may be significant determinants of physical activity among pregnant and postnatal women.

4.1.2 Intention

According to the Theory of Planned Behaviour⁴, intention is the cognitive representation of a person's readiness to perform a given behaviour, the immediate antecedent of a behaviour. Reviews have shown that intention has a significant effect on both men's and women's physical activity behaviour.²⁴³ Empirical studies among women have also shown that intention to participate in physical activity significantly predicted physical activity behaviour among non-pregnant^{87, 251, 258, 275} and pregnant women.^{260, 261, 263} McIntyre and Rhodes⁸⁷ showed that physical activity intention also distinguished between mothers who continued to be active upon the transition to motherhood versus those who did not.

However, one study²⁶² that specifically focused on the first trimester found that intention was not a significant determinant of physical activity behaviour. Pregnant women's evaluation of their confidence in being physically active, or also called physical activity self-efficacy, was more important than their perception of readiness. Since intention did predict physical activity behaviour in the second and third trimester,^{260, 261} it was suggested that this discrepancy could be due to the specific physical and psychological demands of the first trimester. It can therefore be concluded that intention appears to be a significant determinant of physical activity behaviour among women, mothers and pregnant women, but since no research identified intention as a significant during the first trimester and the postnatal phase, this may not be a significant determinant during these phases in a woman's life. Further investigation is needed.

4.1.3 Motivation

Motivation can be defined as the desire that energises and directs goal-oriented behaviour²¹ and can be categorised as intrinsic or extrinsic. Intrinsic motivation is represented in behaviours that are performed for their inherent interest and enjoyment of the activity itself, while extrinsic motivation is characterised by controlled behaviour that is performed for either personally valued and endorsed outcomes (self-determined extrinsic motivation) or to avoid immediate negative consequences or to obtain ego enhancements (non-self-determined extrinsic motivation).³⁰⁰ Motives differ from behavioural beliefs as motives refer to why people are active not what outcome they think being active would have if they were active.²¹

The literature suggests that a lack of motivation as a barrier of physical activity was experienced among nulliparous women and mothers^{225-227, 245, 250, 254, 276-278, 280-282} and during pregnancy^{104, 105, 248, 265, 268-270, 283} and postpartum.^{248, 279} It has been found that mothers who mentioned preferring to do other things in their spare time than physical activity, were significantly less active than mothers who were happy to spend some of their free time on physical activity.²⁸¹ Enjoyment of physical activity is therefore a key motive. Table 4.1 summarises the key findings related to intrinsic and extrinsic motives as a determinant of physical activity behaviour. To improve appearance was the only identified extrinsic motive. One study²⁶⁹ pointed out that during pregnancy, having only appearance-related motives can be problematic, because the growing body was found reduce motivation for physical activity if prior to pregnancy women engaged in physical activity, only to lose weight and look more defined.

The findings in relation to motives (see Table 4.1) show that the activity itself has to be enjoyable in order for women to participate and that a pleasant atmosphere with the opportunity for social interaction is important. A sense of pride, satisfaction and achievement for being able to combine physical activity with work, motherhood and other responsibilities were also important motives. The literature also showed that women, who mentioned physical activity to be part of their identity, did not stop their exercise routine, because they saw themselves as exercisers. It was part of their life of who they were, which did not change upon pregnancy. One study also showed that these women mentioned wishing to continue because they did not want to be treated differently, like pregnancy was a disease.²⁶⁹ For these women, nothing had changed apart from the physical changes.

4.1.3.1 Quantitative Evidence: Impact of Motivation on Physical activity

Table 4.4 provides a summary of quantitative findings related to motivation as a determinant of physical activity behaviour among women. Based on all findings related to motivation, it can be concluded that motivation is a significant determinant of physical activity behaviour in the general population, and among nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase.

Table 4.4 *Quantitative evidence of the impact of motivation on physical activity among women*

Evidence	Source
During pregnancy, intrinsic motives for PA decreased due to physical discomfort, tiredness and other reasons, which significantly decreased PA behaviour	265
Only women who exercised were intrinsically motivated to be active during pregnancy	265
Women who enjoyed walking, were more likely to engage in recommended levels of leisure-time PA	275
Among pregnant women, enjoyment of PA was a strong correlate of any activity, any recreational activity and high volume recreational activity	274
The wish to maintain a regular PA routine was the only motive that increased as pregnancy progressed	105

PA= Physical activity

Intrinsic motivation appears to be especially a key determinant of physical activity behaviour among pregnant women. Those who are motivated by intrinsic motives appear to be more likely to continue exercise programs in clinical, corporate, and community settings and also appear less sensitive to physical activity barriers, such as inconvenience or competing lifestyle behaviours.²⁴¹ Motives tend to differ by gender as women appear to be more likely to report release of tension and social factors as major benefits of physical activity compared to men.²⁴² Although skill development and challenge were mentioned as significant motives for physical activity in the general population,²⁴² previous studies have not identified this as a motive to be active among women. These motives may therefore only be significant among men.

4.1.4 Knowledge

The findings of a review²⁴¹ showed that there was little relationship between improving knowledge and physical activity participation in the general population. Moreover, one study indicated that although a lack of knowledge was mentioned as a barrier to physical activity among women, their responses showed they were well aware of the benefits of physical activity.²⁴⁴ However, one study among midlife women pointed out that information on the benefits of physical activity related to the body and mind, made it more likely for women to attempt engaging in physical activity despite their busy

schedules.²⁶⁴ In addition, a study among multiethnic socio-economically disadvantaged urban mothers showed that not having the required knowledge and skills to be able to engage in activities such as swimming or other skill required activities encumbered physical activity.²⁸²

Studies among pregnant and postnatal women showed that the lack of knowledge or acquisition of incorrect knowledge about physical activity (e.g., what activities are safe, what activities to avoid) acted as a barrier to their physical activity behaviour.^{268, 270, 291, 292} However, only one study addressed a lack of knowledge as a barrier to physical activity among postnatal women.²⁹¹ It can therefore be concluded that although knowledge seems to be a significant determinant of physical activity during pregnancy, more research is needed to make a final conclusion in relation to non-pregnant women.

4.1.5 Self-efficacy

Among the psychological determinants of physical activity that have been examined, physical activity self-efficacy is one of the strongest and most consistent determinants of physical activity behaviour. Self-efficacy refers to the confidence an individual has in performing certain behaviours.⁵ Physical activity self-efficacy can be defined as the confidence a person has in engaging in regular physical activity.⁶ Barrier self-efficacy in relation to physical activity can therefore be defined as the confidence a person has in overcoming barriers to physical activity.

Only one qualitative published study was identified that addressed self-efficacy.²⁵⁹ In this study among Somali women in the US, self-efficacy beliefs appeared to be high. Provided a culturally appropriate facility was available, they expressed confidence towards engaging in exercise despite challenges such as fatigue, physical discomfort, inclement weather, or lack of transportation.

Many quantitative studies have identified physical activity self-efficacy and barrier self-efficacy as important determinants of physical activity behaviour in the general population and among nulliparous women, pregnant women, postnatal women and

mothers (see Table 4.1). Table 4.5 summarises the key findings of the quantitative studies in relation to self-efficacy as a determinant of physical activity behaviour among women.

Table 4.5 *Self-efficacy as a determinant of physical activity among women*

Evidence showing a positive correlation	Source
Throughout pregnancy PA self-efficacy independently predicted PA behaviour with both self-efficacy and PA showing a steady decline	283, 295
Barrier self-efficacy predicted PA behaviour throughout pregnancy	283
Higher PA self-efficacy was associated with more frequent PA at one year postpartum	223
PA self-efficacy was a critical correlate of PA behaviour after the first postnatal year	87, 251
Self-efficacy was one of the strongest determinants of PA behaviour among both women with and without young children	251
Self-efficacy for walking was significantly associated with achieving recommended leisure-time PA among women	275
Self-efficacy was one of the most significant predictors of PA among African-American women	258
African- American women who had higher levels of self-efficacy were more likely to have a higher duration of total leisure-time PA	293
A lack of personal experience and exposure to PA contributed to feelings of low self-efficacy for personal leisure-time PA among Mexican and African-American women	250, 293
Although significance in predicting PA was not measured, it was shown that 40% did not believe they were able to set aside time for regular exercise, 43.6% of the women mentioned they did not consider themselves able to exercise when they are feeling sad or highly stressed, and 61.8% mentioned not feeling able to exercise when work, family or social life was demanding a lot of their time	282
Evidence showing a negative correlation or null-association	Source
Women with higher levels of PA self-efficacy were less likely to meet recommendation or report any activity compared to women with low self-efficacy	276
A null-association was found between self-efficacy and PA behaviour among women and pregnant women	260, 261, 294
Self-efficacy was a significant determinant of PA behaviour in the first trimester yet was not a determinant of PA throughout the second and third trimester of pregnancy	263
Women with low self-efficacy were more likely to engage in any PA	274

PA= Physical activity

These findings suggest that although self-efficacy seems to be a significant determinant among women and mothers, it is unclear whether self-efficacy is a consistent determinant of physical activity throughout pregnancy. Findings suggest that as pregnancy progresses, constant physical, hormonal and linked emotional changes result in a constant changing sense of physical activity self-efficacy. This inconsistency in physical activity self-efficacy levels makes it hard to predict physical activity behaviour throughout pregnancy. More qualitative research is required to find out how levels of physical activity self-efficacy change over time, its influence on women’s physical activity behaviour and which factors influence physical activity self-efficacy during pregnancy and postpartum.

4.1.6 Sickness, Tiredness and Physical Discomfort

The experience of physical discomfort and tiredness during pregnancy is variable among women and at different stages of pregnancy, and is a commonly identified determinant of antenatal physical activity behaviour in the literature (see Table 4.1). Table 4.6 provides a summary of key findings related to physical discomfort and tiredness as determinants of physical activity behaviour among pregnant women.

Table 4.6 *Key findings regarding physical discomfort and tiredness during pregnancy*

Finding	Source
Tiredness, nausea, vomiting, shortness of breath, heartburn, groin pain, joint pain, pelvic pain, dizziness, palpitations, leg cramps, body soreness, irregular contractions, and feeling too big and uncomfortable to move, were frequently mentioned as significant barriers to PA during pregnancy	87, 104, 105, 248, 252, 265, 268, 269, 283, 292, 297, 298
During pregnancy, shortness of breath, heartburn, groin pain, leg cramps, and body soreness increased over time. Fatigue was being consistently reported and nausea decreased over time	105
Tiredness and physical discomfort during PA were reported as barriers of PA and significantly increased as pregnancy progressed	105, 283
Pregnancy-related discomfort, having a complicated pregnancy and the growing body were significant barriers to PA during pregnancy	269
The growing body made many activities a lot harder, which made women reduce intensity, duration and type of activity to make PA more enjoyable and ‘safer’	269

Unpleasant physiological reactions during jogging or aerobics due to pressure on the bladder made some women switch to other forms of exercise	269
Pregnancy complications such as bleeding, made some women feel unable to continue PA during pregnancy	269
The following pregnancies were reported to be a lot more tiring than the first pregnancy due to the energy consuming task of childrearing	268

PA=Physical activity

One study²⁶⁹ also showed that pregnant women who felt nauseous, tended to avoid class based indoor physical activity. These women mentioned that the smell of sweat in the room and feeling hot would worsen their nausea, while cycling or walking in the open air were frequently perceived to diminish nausea.²⁶⁹

Fatigue was also reported as a significant correlate of physical activity behaviour among postnatal women,^{87, 246, 252, 279, 296} mothers past the postnatal phase and nulliparous women.^{93, 225, 227, 245, 247, 264, 276-279, 281, 282, 284, 297} Women expressed that at the end of the day they felt too tired from work, childcare, cooking and other domestic chores to exercise.²⁷⁸ Compared to the findings of reviews in the general population, these studies indicate that tiredness and physical discomfort are women specific barriers to physical activity behaviour, with physical discomfort being a pregnancy specific determinant.

4.1.7 Priority

Although many women have reported lack of time as the main reason for inactivity, one should also consider it a lack of priority.³⁰¹ Women, who were asked how they would cope with finding time to exercise, expressed that prioritising physical activity was hard.^{282, 288} One study also indicated that pregnant women commonly considered resting, not smoking or consuming alcohol as significantly more important than exercising regularly and having an active lifestyle during pregnancy.²⁷⁰

4.1.7.1 *Prioritising one's Children and Family above Oneself*

Research has shown that nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase struggled to fulfil personal needs such as engaging physical activity, because they prioritised their children, family, home and/or work schedules above their own needs.^{112, 247, 249, 252, 254, 256, 264, 279, 284, 290} One study indicated that among postpartum and multigravida women, caring for others was the second most common barrier to physical activity.²⁵² Another study also indicated that women felt guilty and selfish to ask others to mind their children.²⁸⁴

A need for greater appreciation for the complex and demanding work that mothers do and for the many roles they have to fulfil has been expressed.¹¹² Based on these findings, Lewis and Ridge¹¹² argued that if physical activity would be seen as a way of being active with family and friends, assisting with improving coping skills to deal with the challenges of motherhood, and as something that contributes to the wellbeing of the family, it may have a more positive and a less selfish meaning for women. Physical activity beliefs related to guilt, selfishness and the definition of a good mother have been addressed in section 4.1.1.1. Beliefs related to the definition of a good mother in relation to social role strain and gender role expectations are further discussed in section 4.2.2.4.

Priority may be a significant determinant of physical activity among women, especially during motherhood. As this is not mentioned in general population focused review studies, this may be a significant determinant for women only. As only one study focused on physical activity priority during pregnancy,²⁵² more research is required to investigate this potential determinant during pregnancy.

4.1.8 *Body Image and Self-esteem*

Self-esteem can be defined as “the experience of being competent to cope with the basic challenges of life and being worthy of happiness and the sum of self-confidence (i.e. a feeling of personal capacity) and self-respect (i.e. a feeling of personal worth)”.²⁶ Body image is defined as the psychological experience of one's own body”.⁷ Self-esteem and body image have been regularly cited as determinants of physical activity among women

(see Table 4.1). Table 4.7 summarises the main findings related to self-esteem and body image as determinants of physical activity behaviour among women.

Table 4.7 *Key findings regarding self-esteem and body image as determinants of physical activity among women*

Key finding	Source
Having a negative body image acted as a barrier to engage in PA programs and especially at gyms or in exercise classes, due to feeling overly self-conscious	112, 247
Avoiding exercise facilities, due to feeling intimidated by staff and other members (especially men), was commonly mentioned	299
PA was believed to improve body image. Women reported that outdoor activities such as walking made them feel confident and good about themselves	238, 299
African American women did not to feel the urge to be skinny, because a slightly larger body type was perceived as more sexually attractive within their culture	278, 290
Indian-American women mentioned feeling less competitive about their physical appearance than Caucasian women and consequently less motivated to be active to please men	254
Young Caucasian women initially wanted to be active to lose weight or achieve a better body image. Once satisfied with their weight and body shape other outcomes, such as achieving certain PA related goals, became more important	255
body image issues related to being overweight and finding appropriate clothing (sport bra, swim suits) for overweight women encumbered physical activity	282
Striving for the ideal slim female body, especially during midlife, rather than becoming more active for better physical and mental health appeared to undermine women's confidence, satisfaction and pleasure in being active, threatening women's body image and mental health	112
During the third trimester of pregnancy, low body image and self-esteem reduce women's PA behaviour as women often felt embarrassed about their physical appearance during this last stage of pregnancy	291

PA= Physical activity

The literature indicates that body image is a culturally sensitive issue. Self-esteem and body image were not identified as a determinant of physical activity in any of the population based review papers, indicating that these determinants may only be relevant in relation to physical activity among women. In addition, only one study was found that addressed body image as a determinant during pregnancy, which only appeared to be significant in the third trimester, indicating that this may be only a significant

determinant among non-pregnant women. However, more research is needed to make any final conclusions.

4.1.9 Knowledge Gaps related to Individual Level Determinants of Physical Activity

Table 4.31 provides an overview of the results of this review in relation to the individual determinants of physical activity among women. Seventy-three studies focused on the association between individual determinants and women's physical activity behaviour. Forty-three studies included Caucasian, Aboriginal or Torres Strait women. The remaining thirty studies included women of other ethnicities. Thirteen studies were conducted in Australia, of which only four focused on pregnant and/or postpartum women. Of these four studies, none were conducted in Queensland. This can therefore be identified as a knowledge gap – in the published, peer-reviewed literature – in the context of informing the design of physical activity promotion interventions for this population group. One cannot assume that Queensland women are the same as women in other states of Australia or other parts of the world, and thus more research is needed to identify the individual barriers to and enablers of Queensland women's physical activity behaviour during pregnancy and postpartum. Qualitative research on the individual determinants of physical activity is useful in improving understanding of the association between the individual determinants and physical activity behaviour among Queensland women during pregnancy and postpartum.

4.2 Social Environmental Level Determinants of Physical Activity

The social environment can be defined as “the shaping norms that enforce patterns of social control, provide or not provide environmental opportunities to engage in particular behaviours, reduce or produce stress, and place constraints on individual choice”.³¹ Effective public health focused on promoting physical activity must address modifiable social environmental factors that can support behaviour change as the social environment holds many high leverage points for physical activity intervention design,¹³⁵ which is

discussed in this section. The 3 most commonly studied groups of social determinants of physical activity are: 1) interpersonal relationships (e.g., social support and social networks); 2) social inequalities (e.g., socioeconomic status and income inequality); and 3) neighbourhood and community characteristics (e.g., social cohesion, social capital and neighbourhood factors),^{34, 136-142} which are represented in Table 4.8.

Table 4.8 *Social environmental determinants of physical activity behaviour*

Determinants	General population	Women and mothers	Pregnant women
Interpersonal Relationships			
<i>Social network</i>	34	249, 256, 285, 291, 302	268, 291
<i>Social support</i>		87, 251	
<i>Support from partner, family and/or friends</i>	30, 34, 241, 242	93, 225, 244, 246, 247, 249, 250, 252, 254, 256, 275, 277-279, 282, 284, 291, 293, 303	104, 248, 252, 264, 265, 268, 274, 291, 303
<i>Support at worksite and job nature</i>	34	254, 256, 275, 277, 278, 290, 302	
<i>Belong Support: Companionship and social interaction</i>	34, 241, 242, 304, 305	93, 230, 245, 246, 264, 277, 279, 280, 284, 285, 287, 291, 296, 302, 303	104, 268, 291, 298, 303
<i>Informational support: sparse and inconsistent</i>	241, 242	252, 303	104, 252, 265, 268-270, 273, 274, 292, 298, 303, 306
Social inequality			
<i>Education and work inequality</i>	34	28, 93, 297	307
<i>Income inequality and costs of PA and childcare facilities</i>	34	93, 238, 245-247, 249, 250, 253, 254, 277, 278, 282, 287, 290, 296, 302	268, 298
<i>Racial differences, isolation and discrimination</i>	30	249, 250, 253, 268	
<i>Gender inequality</i>			
<i>Social norm in relation to PA</i>	30	87, 225-228, 230, 251, 254, 258, 259, 276-278, 282, 290, 291, 294, 302, 303, 308	87, 104, 260, 261, 265, 291, 298
<i>Gender role expectations</i>		112, 238, 244, 250, 257, 264, 282	

<i>Time constraints and social role strain</i>	241, 242	87, 93, 112, 225-227, 238, 244-248, 250, 252-254, 256, 257, 264, 268, 275-279, 281, 284, 288, 290, 291, 296, 297, 299, 308-310	87, 104, 248, 252, 265, 270, 274, 283, 291, 298
Neighbourhood and community characteristics			
Social cohesion and Social capital	30, 34	28, 250, 257, 275, 288	
Neighbourhoods factors			
<i>Neighbourhood safety: perceived crime</i>	23, 30, 34, 311, 312	28, 30, 244, 249, 250, 253, 254, 276-278, 284, 291, 294, 299, 302	248, 268, 283, 286, 291, 313, 314

Note: The numbers refer to research papers, which can be found in the reference list, PA= Physical activity

4.2.1 Interpersonal Relationships

Interpersonal relationships can be defined as the combination of the social structure (social networks) of an individual's social life (e.g., existence of ties with family and friends) and the more explicit functions they may serve (social support).¹⁹ The following sections discuss their influence on physical activity behaviour in the general population, and among nulliparous women, pregnant women, postnatal women and mothers past the postnatal phase.

4.2.1.1 Social Networks

A social network refers to the collective structure of social relationships that surround an individual and provide information on how an individual is integrated with others.³⁴ Through social networks a sense of attachment and connectedness can be created among individuals, which could lead to the provision of various types of support (e.g., child minding). Among individuals and organisations social networks can also provide assistance with starting and maintaining a healthy physical activity level, and political lobbying which can promote and support physical activity participation. Although only a few studies have been identified that focused on the influence of social networks on physical activity behaviour (see Table 4.8), the results have shown that select social network characteristics such as number of individuals in the network, frequency of

contact, and network homogeneity are positively associated with energy expenditure and exercise adherence.³⁴

Pregnant and postpartum women have expressed feelings of isolation due to the lack of friends, which was perceived as a barrier to physical activity behaviour.^{256, 268} Some women viewed becoming physically active as a group effort and that women should work together to establish an emotional connection to increase motivation for physical activity.³⁰² This feeling was also expressed by other pregnant and postpartum women who reported the need of programs that provide opportunities to expand their social networks and make friends while relieving stress and boredom.²⁹¹ Other women also suggested the development of social networks as an important physical activity intervention strategy.²⁴⁹ They expressed the need for help with organising groups in such a way that they can help each other and take turns with childcare so everyone has the opportunity to exercise.²⁴⁹ However, just improving social networks may not be enough. Previous research showed that although a weekly walking group improved women's social networks, satisfaction with their social contacts and possibly women's mental health, it had no effect on their overall physical activity habits.²⁸⁵ This indicates that social networks may only be a significant determinant of physical activity behaviour among women if explicit social support for an active daily lifestyle within this network is provided. More research is needed to investigate the influence of social networks on physical activity behaviour among nulliparous women, mothers, and pregnant and postnatal women. The influence of social support on physical activity is discussed in the following section.

4.2.1.2 Social Support

Social support can be referred to as support which is “provided by other people and arises within the context of interpersonal relationships”³⁵ and as “support accessible to an individual through social ties to other individuals, groups, and the larger community”.³⁶ Although there is no official agreement as to what functions of social support can be provided by individuals, for the purposes of this reviews social support consists of emotional support, informational support, instrumental or tangible support, and belonging support.³⁷

Many women have reported lack of social support as an important barrier to physical activity (see Table 4.8). Previous research found that social support was reported to discriminate between mothers who continued to be active and those who did not after the transition to motherhood.⁸⁷ However, other research showed that social support only predicted energy expenditure among women without children.²⁵¹ These two studies were quantitative and did not specify the types of social support offered. Studies that did report on specific types of support are discussed in the following sections. The following sections discuss qualitative evidence, followed by quantitative evidence of partner, family, friends and worksite support as determinants of physical activity behaviour among women.

Emotional and Instrumental Support for Physical Activity from Partner

General population based studies have shown partner support to be positively associated with increased physical activity behaviour.^{34, 241} Table 4.9 provides an overview of the key qualitative findings identified in the literature regarding partner support as a determinant of physical activity among women.

Table 4.9 *Key qualitative findings regarding partner support as a determinant of physical activity among women*

Finding	Source
A lack of partner support was mentioned to be a significant barrier to PA among women	249, 250, 254, 279, 282, 291
Women explained that lack of social support from partner for PA during motherhood was caused by the cultural belief that participation in leisure-time PA was not part of the women's expected social role and stood in the way of her primary family and work responsibilities	249, 250, 291
Latin women also mentioned that because PA was culturally linked to single women flaunting their bodies, engaging in leisure PA when married and/or a mother was perceived by partners as inappropriate	291
Mexican and African American women believed they needed the approval and encouragement of her husband to engage in leisure-time PA, unless it fits into the usual family life pattern	247, 277
Some Latin women described that they were encouraged by their partner to engage in PA appropriate during pregnancy and postpartum to ensure they would feel good, and to prevent excess weight gain and illness, based on the belief that wellbeing depended on the balance between physical and emotional states	303

Harsh criticism and humiliation from their partner, because of their weight and physical appearance after pregnancy was also expressed by Latin women	303
Rural Caucasian women mentioned their husband or partner was generally supportive of them engaging in PA as long as they were still cooking dinner	284
Help with childcare from partner was believed to significantly improve women's PA behaviour, but this was only possible in evenings or weekends when husbands were home from work and women commonly felt uncomfortable asking their husband or partner to care for more than one child at a time	256, 303
Assistance from their partner with housework was perceived as an important facilitator of PA as it provided women with more time to engage in enjoyable activities	277
During pregnancy, partner support was positively associated with any recreational activity	274

PA=physical activity

The findings in the literature indicate that partner support for physical activity may be a significant determinant of physical activity behaviour during pregnancy and postpartum. Findings also showed that social support from partner appears to be strongly influenced by culture and social norms. Caucasian cultures appeared to be more supportive of physical activity among women.

Emotional and Instrumental Support for Physical Activity from Family

General population based reviews have shown that family support has a significant influence on physical activity behaviour.^{34, 241, 242} Table 4.10 provides an overview of the key qualitative findings identified in the literature regarding family support as a determinant of physical activity among women.

Table 4.10 *Key qualitative findings regarding family support as a determinant of physical activity among women*

Finding	Source
Women did not receive much social support from family members to be active, because PA was a topic that was never discussed	254
PA during motherhood was discouraged in Mexican American cultures. Women mentioned that to begin a PA program, approval of their family members was needed	247

Family members can also decrease women's PA behaviour by engaging in regulatory or nagging behaviour towards PA	30
During pregnancy, women received strong support from their family, but not for PA	264
Women who did not exercise during pregnancy commonly mentioned a lack of emotional support for PA from family	265
Women mentioned family support and the opportunity to be active as a family as motivators of PA	282
Assistance with domestic chores, encouragement for PA and companionship during activities from family were mentioned to be significant facilitators of PA among women	264
Emotional support and a sense of accountability by family members was also mentioned as a needed motivator to engage in PA during pregnancy and the postnatal period	252, 265
During pregnancy, women commonly received support for low intensity PA from their family, but were expected to limit strenuous PA to protect the baby and mother's health, especially by their mother	291, 303
During pregnancy, families were commonly described as being overly protective, which discouraged PA	265, 268
A lack of family support in terms of encouragement was experienced among woman of all cultural backgrounds, however non-Caucasian cultures were more likely to discourage PA due to the common belief that leisure PA stands in the way of women's social and domestic responsibilities	247, 249, 250, 291

PA= Physical activity

These findings indicate that physical activity discouragement from family members was more common in non-Caucasian cultures. However, social support from family members appears can be a significant enabler of physical activity among women across all cultures, especially during pregnancy and motherhood.

Emotional and Instrumental Support for Physical Activity from Friends

General population based studies have shown a positive correlation between supportive friends and physical activity behaviour.³⁴ Table 4.11 provides an overview of the key findings regarding friend support as a determinant of physical activity among women. Quantitative evidence regarding social support from partner, family and friends is discussed after.

Table 4.11 *Key qualitative findings regarding support from friends as a determinant of physical activity among women*

Finding	Source
Caucasian women have mentioned receiving strong support from their friends, but not for PA. These women expressed a need for PA encouragement and for companionship during physical activities	264
Women mentioned companionship from friends to help with engaging in PA	282
Women who did not exercise during pregnancy commonly mentioned a lack of emotional support for PA from friends. Emotional support and a sense of accountability by friends was needed to motivate them to engage in PA	265
In the postnatal period, women commonly received emotional support from calling a friend or belonging support via companionship during a walk	256

PA= Physical activity

Limited qualitative studies indicated friend support as a significant determinant of physical activity among women. From these findings it can only be speculated that support from friends appears to be a more significant determinant of physical activity among Caucasian women compared to support from family and partners, while support from family members seems to have a stronger influence on non-Caucasian women's physical activity habits than support from friends.

Emotional and Instrumental Support at Worksite

According to general population based research, individuals with a high status job were more likely to engage in healthy behaviours (e.g., physical activity participation) than those with a lower job status.³⁴ A desk bound job was perceived as a significant barrier to physical activity among women, while physically demanding jobs, such as loading trucks or service jobs related to child and home care, were perceived as facilitating physical activity.^{277, 302} Table 4.12 provides an overview of the key qualitative findings related to support at worksite as a possible determinant of physical activity behaviour among women with sedentary jobs.

Table 4.12 *Key qualitative findings related to worksite support as a determinant of physical activity behaviour among women with sedentary jobs*

Finding	Source
Many women expressed the need for workplace support for PA, colleagues to join them and role models to encourage them	254, 256
Women have identified their work environment to be a barrier to PA due to a lack of employer support; too short lunch breaks, no sponsored PA programs or events. In addition, a general apathy about PA among colleagues leading to cancellation of PA programs was also reported	254, 278
Support at work through institution of exercise programs, exercise-break lunch policies, discounts to athletic clubs or bonuses to those who exercise have been reported as potential facilitators of PA behaviour among women	290

PA= Physical activity

Findings suggest support at work to be a possible determinant of physical activity behaviour among working women. However, no studies were identified that focused on worksite support as a determinant of physical activity behaviour among working pregnant women or mothers specifically. More research is needed to make final conclusions in relation to worksite support as a determinant of physical activity behaviour among working pregnant women and mothers. The following section discusses the quantitative findings in relation to support from partner, family, friends and at worksites as determinants of physical activity behaviour among women.

Quantitative Evidence: Impact of Emotional and Instrumental Support on Physical Activity

Table 4.13 provides an overview of the key quantitative findings for social support from partner, family, friends and worksite as determinants of physical activity among women. These findings indicate that support from partner, family and friends are important determinants of physical activity behaviour among women across all cultures, with variations as indicated in Table 4.13. It can also be concluded that although worksite support can be a significant determinant of physical activity among women, it is unclear whether worksite support can be a significant determinant among working pregnant women and mothers. More research is therefore needed to make any conclusions

regarding worksite support on women’s physical activity behaviour during pregnancy and motherhood.

Table 4.13 *Quantitative evidence for correlation between social support from partner, family, friends and worksite, and physical activity among women*

Evidence	Source
Partner support was positively associated with any recreational activity among pregnant women	274
During pregnancy and motherhood, women with a partner or family who were supportive towards PA during pregnancy, were more likely to be active	248
Partner support had a significant positive influence and a lack of partner support had a significant negative influence on women’s PA behaviour	244, 246, 249
A significant positive correlation was found between support from partner or family and women’s PA behaviour; encouragement, assistance with domestic chores, looking after the children, help with planning activities around their PA routine and joining women for physical activities	93
Family support was a significant facilitator of PA among Caucasian women	277
Family support did not have a significant influence on PA behaviour among Caucasian women	275, 293
Support from friends was found to be a significant facilitator of PA among women; companionship during physical activities or assistance in planning activities around their PA routine	93
Among Caucasian and African American women, no significant correlation between family support and PA behaviour was found. Social support from friends however was a significant PA facilitator	275, 293
Working women who were physically active reported lower family support but higher levels of social support from friends than women who were inactive	30

PA= Physical activity

Belonging Support: Companionship and Social Interaction

Several population based reviews have addressed the importance of “buddy systems” or physical activity companionship as an important facilitator of physical activity behaviour.^{34, 241, 304} More specifically, convincing evidence for a positive association was also found between companionship, walking and moderate-to-vigorous activity in adults.³⁰⁵ Social interaction during activities was also among the top reasons for women to participate in regular physical activity.²⁴² Table 4.14 provides an overview of the key

qualitative findings in relation to companionship as a determinant of physical activity among women. These qualitative findings indicate that companionship and social interaction during activities may be important determinants of physical activity among nulliparous women, mothers, pregnant and postnatal women.

Table 4.14 *Key qualitative findings regarding companionship as a determinant of physical activity among women*

Finding	Source
Being active with others gave women the motivation to be active	277, 303
Women have reported that time goes a lot faster when active with someone else	284
During pregnancy, African-American women articulated the desire for exercise groups with other pregnant women, and for leisure-time PA with family, friends and partner	298
Companionship of a close friend or family member provided women with a higher sense of enjoyment, including discussion of daily life issues while walking	264
During pregnancy and the postnatal period some Latino women mentioned companionship from family or partner to be essential as PA by themselves or with others was often perceived as unacceptable	303
Companionship through walking groups offered women the opportunity to meet new mothers and socialise, which made the walk more enjoyable	285
Active women have mentioned that the opportunity for social interaction that companionship offered was one of the main reasons for engaging in PA. Insufficiently active women have mentioned that exercise would have to be more sociable for them to participate.	280, 284
Also during pregnancy the opportunity to socialise and engage in exercise classes or walks with other pregnant women was perceived as motivating	104
Women mentioned a need for a judgement free place where everybody is welcome, where there is a sense of community and trust, and where women can be active and socialise	282

PA= Physical activity

Table 4.15 provides an overview of the quantitative evidence in relation to companionship as a determinant of physical activity among women. These findings indicate that although social interaction by itself may not be a significant determinant of physical activity among women, companionship from other people appears to be a significant determinant of physical activity among nulliparous women and mothers. However, more research is needed on social interaction as a determinant of physical

activity among women as only one quantitative study was identified that focused on this correlation.

Table 4.15 *Quantitative evidence for companionship and social interaction as determinants of physical activity among women*

Finding	Source
Although companionship for PA was not a significant determinant among women between the age of 16 and 25 years, it was a significant determinant of PA among women between 35 and 45, and between 50 and 65. The need for companionship became more profound after the age of 35	230
In regard to social interaction, a significant association between valuing social interaction and PA behaviour among women was not found	245
At 1 year postpartum companionship of partner in activities was a significant determinant of women’s PA behaviour, while having a dog that needed to be walked did not significantly predict women’s PA behaviour	246
owning a dog or a horse emerged as one of the most important factors associated with the probability of women participating in outdoor recreational PA	287

PA= physical activity

Findings related to companionship from pets as a determinant of physical activity behaviour among women are inconsistent, depending on whether pet-related activities were perceived as enjoyable or as a chore. The influence of pets on physical activity behaviour has not been sufficiently investigated to draw any final conclusions.

Informational Support about Physical Activity: Sparse and Inconsistent

A review that focused on the general adult population indicated that physicians represent potentially effective change agents for increasing physical activity, but evidence on their impact has been mixed.²⁴¹ Another review indicated that women were more likely than men to follow doctor’s advice, making doctors more influential when women’s health is concerned.²⁴² During pregnancy and postpartum, women have frequently addressed informational support as a significant determinant of physical activity behaviour (see Table 4.8). Table 4.16 presents an overview of the key findings in relation to the scarcity and inconsistency of physical activity advice during pregnancy and postpartum.

Table 4.16 *Summary: Scarcity and inconsistency of physical activity advice during pregnancy and postpartum*

Finding	Source
During pregnancy, a lack of informational support from health care providers has been identified. Of the women who did exercise, only half were advised about PA	265
During pregnancy, African-American women expressed frustration towards their health care provider, who often failed to provide necessary education and guidance regarding the types and frequency of activities that would be safe for them to engage in	298
Pregnant women indicated that advice from their physician was most often minimal and vague	270, 292
A study among Latin women mentioned that husbands were the most important source of informational support for increasing PA. However, advice from husbands reflected a limited understanding of PA during pregnancy and postpartum. Advice from health professionals was limited to the promotion of walking	303
Nearly 72% of all women mentioned not being provided with any information about PA from a health care professional during and after pregnancy. Some women mentioned they had not received any information about PA until being diagnosed with gestational diabetes	252
During pregnancy, advice from health professionals about PA guidelines and about the appropriate time to begin PA after delivery, appeared to be inconsistent and contradictory in regard to intensity, frequency and types of activity	268, 273
Conflicting advice from health professionals compared to advice from family and friends or conflicting advice within their family or group of friends caused confusion. Family discouragement of PA vastly outweighed family encouragement	268, 270, 292
Physicians never explained the reasons behind the PA related advice or failed to make the advice concrete. This made pregnant women rely on advice from family and friends	268
Women had received conflicting information from midwives about PA during pregnancy	269
A study that focused on knowledge and practice among obstetricians showed that 20-30% did not collect information on types of activity, history of exercise before pregnancy, or frequency, duration or intensity of PA. Obstetricians commonly provided conflicting advice.	306
Obstetricians who had practiced for more than 15 years were more likely to be outdated in their knowledge around PA. Obstetricians who reported continuing education were more likely to agree that PA and exercise during pregnancy would improve the baby's health.	306
Women who were training with a personal trainer mentioned their trainer did not want them to resume training until after week 12 gestation, because of the risk of a miscarriage	269

PA=Physical activity

Findings suggest that present health education may be failing to correct inaccurate perceptions of the risks associated with physical activity during pregnancy and postpartum. This finding is supported by research indicating that women expressed a need for more high quality and consistent information regarding the physical activity guidelines during pregnancy and postpartum,^{252, 265, 268-270, 273, 292, 303, 306} and a need for encouragement to be active from health professionals.^{104, 282}

Only two quantitative studies^{273, 274} were identified that focused on the possible correlation between physical activity advice and physical activity behaviour among pregnant women. Jukic et al²⁷⁴ found that women who had received advice from a health professional to change their physical activity habits were 1.5 times more likely to perform high volume activity compared to women who had not received such advice. Krans et al²⁷³ indicated physicians to be the most influential persons in relation to their physical activity beliefs and that women who were encouraged to engage in physical activity during pregnancy were significantly more likely to be active compared to those who were not. Although quantitative findings are limited, qualitative findings suggest that informational support, especially from physicians, can be a significant determinant of physical activity during pregnancy and postpartum.

4.2.2 Social Inequality

Social inequality exists when people frequently receive more of a society's 'valuable goods' than others owing to their position in the social network of relationships.³² It can be viewed as an unequal distribution of power, privilege, and prestige.³³ Socio-economic differentials are consistently identified as determinants of health related behaviour, including physical activity.³¹⁵ It is well established in the general population that individuals at the highest levels of income, education and job classifications are more likely to engage in healthy behaviours such as leisure-time physical activity and sport related activity, while those with lower socio-economic status are more likely to report job-related physical activity and walking.³⁴ For the purposes of this review, findings related to social inequality were divided in: 1) education and work inequality, 2) Income inequality, 3) racial differences, isolation and discrimination, and 4) gender inequality: social norm, gender role expectations, time constraints and social role strain.

4.2.2.1 Education and Work Inequality

Table 4.17 provides an overview of the key findings related to education and work as determinants of physical activity among women. These findings suggest that during pregnancy, educated women may be more aware of the possible risks of high intensity exercise and are therefore active at a lower intensity. Another explanation is that work undertaken by lower educated women is often more physically straining with no option to discontinue due to their financial situation. These findings also indicate that decreasing level of employment resulted in more time spent on physical activity, however, this may only be relevant to women in sedentary jobs and those who can afford to decrease level of employment. Since not many studies were identified that addressed education and work inequality, no final conclusions can be drawn in regard to whether it is a significant determinant of physical activity behaviour among women.

Table 4.17 *Key findings related to education and work as determinants of physical activity among women*

Finding	Source
Women who were university educated, were more likely to engage in leisure-time PA compared to women who were less educated	28
During pregnancy, educated women were more likely to participate in leisure-time PA such as walking and swimming, while less educated women were less likely to decrease their activity levels during pregnancy and more likely to report engaging in strenuous PA at 18 and 32 weeks gestation.	307
Women who decreased their level of employment between early pregnancy and 6 months postpartum had lower odds of becoming insufficiently active compared to women who did not change their level of employment	297

PA= physical activity

4.2.2.2 Income Inequality and Costs of Physical Activity and Childcare facilities

Table 4.18 indicates that costs of exercise facilities can have a negative effect of women's physical activity behaviour, but could also serve as a motivator as women may be more likely to engage in an activity if they have paid for it beforehand. In relation to pregnancy

and postpartum, findings suggest that it is unclear whether costs related to exercise facilities are a significant barrier to physical activity during this life phase.

Table 4.18 Key findings related to income and costs as determinants of physical activity among women

Finding	Source
Mothers with young children living in areas with a low socio-economic index have mentioned lack of money to be a significant barrier of leisure-time PA	93
Mexican women have shown that economic factors restricted access to PA facilities and required exercise clothing	250
Post-migration to Australia, Filipino women with a low socio-economic status were less active than higher socio-economic status women due to a lack of financial means to join a commercial exercise facility, while higher socio-economic status women had commonly joined a gym	253
African American women have reported that their culture had less economic stability and less financial resources to build PA facilities, which reduced opportunity for leisure PA compared to other cultures	290
Australian mothers in higher socio-economic areas were significantly more likely to receive PA support from partner, family and/or friends compared to mothers in lower socio-economic areas. A significantly positive correlation was found between support from partner, family and friends and mother's PA behaviour	93
Poor personal financial situation was significantly associated with a decreased likelihood of engaging in outdoor recreational PA among Swedish women	287
Latina women have mentioned the high costs of childcare services to act as a barrier to their PA habits	249
Women have identified the high cost of exercise classes, gyms and other PA facilities as significant barriers to PA behaviour among women and mothers with young children	238, 245, 254, 277, 278, 282, 302
During pregnancy, African-American women reported the costs of PA facilities to be a barrier of PA	298
Hispanic, non-Hispanic Caucasian and African American pregnant and postnatal women did not commonly consider costs of PA facilities as a barrier to PA	246, 268, 296
Caucasian women have mentioned costs as a barrier and facilitator to PA. Pre-payment motivated them to attend in order to get their money's worth	247

PA= Physical activity

Although lack of assistance with childcare was often reported in previous studies,^{246, 252, 265, 296} only one study²⁴⁹ was identified that addressed costs of childcare as a barrier to physical activity. Costs of childcare may not be a significant barrier as women may prefer childcare support from partner or family. However, more research is needed to find out

the ways in which financial factors influence women's physical activity behaviour during pregnancy and postpartum, as evidence was limited.

4.2.2.3 Racial differences, Isolation and Discrimination

For purposes of this review, social discrimination is defined as any form of prejudice or stigma based on physical traits such as race, weight and age.³⁰ Although research on the effect of racial discrimination on physical activity behaviour appears to be limited, racial discrimination has been found to significantly correlate with emotional distress, greater risk of chronic illness over time, and reduced access to optimal healthcare.³⁰

Only four studies were found that addressed the link between racial discrimination and physical activity behaviour among women.^{249, 250, 253, 268} Personal experiences of racial discrimination further strengthened social barriers between relatively recent immigrated women and the larger community. A study in Australia among culturally and linguistic diverse women showed that minorities often have different needs when it comes to physical activity.²⁵³ Pregnant women and non-pregnant women have reported that language difficulties resulted in negative attitudes, social isolation, and/or lack of confidence towards being active in public, which had a negative impact on their physical activity behaviour.^{249, 250, 268, 282}

For the purposes of this review, social norm, time constraints, social role strain and gender role expectations are viewed as a part of social inequality, because these contribute to gender inequality. These concepts are discussed in the following sections.

4.2.2.4 Gender Inequality

Gender inequality is part of social inequality and refers to disparity between individuals due to gender.³¹⁶ Gender is constructed both socially through social interactions as well as biologically through chromosomes, brain structure, and hormonal differences.³¹⁶ Gender systems are often dichotomous and hierarchical; binary gender systems may reflect the inequalities that manifest in numerous dimensions of daily life.³¹⁶ Gender specific social norms, gender role expectations, lack of time and social role strain reflect gender

inequality and are discussed below in relation to physical activity behaviour among women.

Social Norms in Relation to Physical Activity

Social norms refer to the customary rules that govern behaviour in groups and societies.²⁷ General population based reviews showed that social norms can influence physical activity behaviour.³⁰ Table 4.19 provides an overview of the key findings related to social norms as a determinant of physical activity behaviour among women.

Table 4.19 *Key findings related to social norms as a determinant of physical activity among women*

Finding	Source
Women have reported to engage only in walking as it was the single socially acceptable way to obtain PA related benefits, because walking could be done while fulfilling maternal responsibilities	291
Women have indicated that during the first forty days after childbirth, they were expected to adhere to the cultural norm that a new mother needs to rest without any outdoor PA for the protection of mother and baby. This instruction came mainly from older female relatives	291, 303
Women have indicated that being pregnant intermittently evoked uninvited comments and advice from others and often reflected common myths about PA during pregnancy. Exercising every day was often questioned as risk-taking behaviour, even by health professionals	104
Whether women believed most people in their social network, including their doctor and other healthcare providers, would want them to engage in regular PA, was not a significant determinant of PA among women with or without children	251
The normative belief “friends would approve” was correlated with PA frequency during and after pregnancy	87
Among African-American women, subjective norm was not significantly correlated with PA behaviour	258
Subjective norm significantly correlated with intention and intention strongly predicted PA behaviour in the second and third trimester of pregnancy and after childbirth. A possible direct effect of social norm on PA was not investigated	87, 260, 261
Women have reported to be less active, because they felt judged and intimidated by people who are active, and therefore did not want to become “one of them”	254
The presence of active role models was a significant enabler of PA behaviour among women	225-228, 230, 254, 276, 278, 290, 294, 302, 308

Women have mentioned that since the social norm within their Latina community or culture did not support leisure-time PA for women, role models engaging in leisure-time PA were needed to change the social norm	250
During pregnancy, women have mentioned the absence of role models and social norms that encourage PA as barriers to PA	265
Women mentioned that PA was viewed as inappropriate for women and only for men	247, 282
Aboriginal women expressed that wearing minimal clothing required when engaging in activities other than walking was perceived as inappropriate	257
Somali women mentioned that in their Muslim culture, it is considered inappropriate to be active outside and to wear clothes that reveal the woman's shape. However, exercise in women only gyms or at times when there are no men present was stimulated	259
During pregnancy, African American women mentioned that being born in a family and a community that does not engage in exercise, negatively influenced their own PA levels	298

PA= Physical activity

These findings suggest that social norms related to physical activity among women may be a significant determinant of physical activity behaviour among pregnant women, postnatal women and mothers past the postnatal period. It is unclear whether social norms also influence nulliparous women's physical activity behaviour. These findings also showed that social norms towards physical activity and how compliant women were with such norms depended on the presence and power of religious and/or cultural beliefs. Physical activity related social norms appeared more positive among Caucasian women.

Gender Role Expectations, Time Constraints and Social Role Strain

Closely related to social norms are the concepts of gender role expectations and social role strain. Gender role expectations refer to the set of social and behavioural norms that are considered socially appropriate for individuals of a specific sex in the context of a specific culture, and which differ widely between cultures and historical periods.¹⁷ In relation to women, gender role expectations are the roles that women are expected to fulfil within society and have been found to limit physical activity among women.²⁶⁴ Gender role expectation in relation to physical activity can be viewed as the social pressure to conform to a certain gender specific physical activity behaviour that is considered socially acceptable. Table 4.20 provides an overview of these gender role

expectations and as determinant of physical activity behaviour among women. This table shows that what is acceptable in terms of physical activity behaviour, depended on the woman's age, marital status and whether she has children.

Table 4.20 *Key findings related to gender role expectation as a determinant of physical activity among women*

Finding	Source
Women have expressed that the primary responsibility and expectation was to be a good mother, wife and housewife. This gender role expectation limited PA among women	112, 238, 244, 250, 257, 264
Mothers mentioned that the expectations of a mother are too high to allow PA. These women mentioned that if they would voice wanting to exercise that there would be an issue, because this would mean that some of the expectations may no longer be met	282
There appears to be an expectation that as soon as a woman becomes a mother, she belongs "in the private world of domesticity", which continues during midlife	238
Mexican women feared that because of these internalised expectations of women's primary responsibilities, doing something for themselves such as leisure PA could be interpreted as being selfish or lazy	250
Other Mexican women mentioned a negative attitude towards leisure PA as a result of the constraints imposed by social and cultural values related to their maternal, spousal, and occupational roles. They had no energy left for PA once all responsibilities were met	244
Aboriginal and Mexican women mentioned that leisure PA belonged to the world of men, not women. Women reported their husbands would get jealous, because it was believed that PA leads to a sensual body image, which does not fit with the cultural views of the body image of a married women with children	244, 257
American Indian women have also reported that fear of ridicule or pressure about breaking societal norms to be a significant barrier to PA	254

PA= Physical activity

Social role strain has been defined as "the felt difficulty in fulfilling role obligations".³⁸ For the purposes of this review, social role strain is viewed as the outcome of gender role expectations. Mothers frequently indicated that a lack of time, due to the numerous social roles they have to fulfil, contributed to not partaking in leisure physical activity. Nulliparous women and pregnant women also mentioned lack of time to be a significant barrier to physical activity behaviour (see Table 4.8). Although lack of time has previously been described as an individual determinant, in this review it is considered as a social

environmental determinant. Lack of time for physical activity due to the urge to conform to the social expectation to fulfil certain roles should be viewed as a social instead of an individual issue. Table 4.21 provides an overview of the key findings related to lack of time and social role strain as determinants of physical activity among women.

Table 4.21 *Key findings related to time constraints and social role strain as determinants of physical activity among women*

Finding	Source
Women have expressed that the combination of working, childcare, housework and family responsibilities, often left no time for PA	93, 112, 238, 244, 247, 250, 253, 254, 264, 277, 278, 284, 297, 298
Women who reported being able to take time for recreational activity “some of the time” or “none of the time” were significantly less likely to engage in high volume recreational activity compared to women who reported being able to take time for recreational activity “all of the time”	274
A lack of time and childrearing were the most common reported barriers of PA during the postnatal period and during pregnancy among multigravidas	246, 252, 265, 296
After the postnatal period, lack of time due the multiple demands of motherhood was one of the most significant barriers of PA	257, 281, 288
Spare time was seen as something fragmented and unpredictable. Because the demands of their young children were unpredictable, time for themselves including PA was perceived as difficult and mostly out of their control	112
Women, especially primiparous mothers, have mentioned the need to engage in self-care such as PA as a sign they were not coping with the daily demands, did not have their life under control, and therefore failed in being a good mother and wife	112
A significant correlation between social role strain and PA among women was found	226, 309
The correlation between social role strain and PA among women was found not to be significant	227, 276, 308, 310

PA= Physical activity

Findings in general population reviews^{241, 242} showed that although lack of time was confirmed to be a determinant of physical activity behaviour among men, this lack of time was not caused by gender role expectations or experienced social role strain. Gender role expectation and social role strain may therefore be significant determinants of physical activity behaviour among mothers only. However, the influence of gender role

expectations on physical activity behaviour among multigravidas and postnatal women was not investigated. Final conclusions in relation to these groups of women can therefore not be drawn.

In regard to gender role expectations, findings indicate that although these expectations may be a significant determinant of physical activity behaviour among women across all cultures, these appeared to be stronger in non-Caucasian cultures. In 2005, two studies have identified that among Caucasian women, resistance against these gender role expectations was starting to show.^{112, 238} Lewis and Ridge¹¹² reported that one of the reasons why some of the Australian women in the study sample were active was to extend the boundaries of what it meant to be a good mother and to resist against the stereotypes of maternal responsibilities. These women mentioned sharing domestic and childcare responsibilities with their partner and seemed to be more relaxed about standards of domestic order. It was perceived as a win-win situation as physical activity was used as an opportunity to loosen restraining gender role expectations around mothers while giving fathers the chance to be involved with their children.¹¹² These findings may indicate that the degree to which these gender role expectations prevent physical activity is culturally sensitive.

In regard to social role strain, a lack of balance between self-care and care for others was a common physical activity barrier in every culture. However, in non-Caucasian cultures, especially Latin/Hispanic, Indian and African women, it did seem more culturally enforced to conform to the social expectation that family comes first.^{244, 247, 250, 254, 257, 278, 290}

Quantitative findings related to the correlation between social role strain and physical activity behaviour among women were inconsistent. However, the influence of social role strain and gender role expectations on physical activity among pregnant and postpartum women has received insufficient investigation. Qualitative research is needed in order to gain an in depth understanding of how these concepts influence women's physical activity behaviour during pregnancy and postpartum. Since these concepts are culturally sensitive, these may be best investigated per region or district.

4.2.3 Neighbourhood and Community Characteristics

Neighbourhood and community characteristics include social cohesion, social capital and neighbourhood factors. Characteristics such as neighbourhood deprivation, presence or lack of neighbourhood resources (i.e., grocery stores), and perception of crime are commonly measured neighbourhood factors.³⁴ Social cohesion and social capital are the core social environmental factors that encapsulate neighbourhood and community factors and influence a myriad of health related behaviours.^{317, 318}

4.2.3.1 Social Cohesion and Social Capital

Research has shown that cohesive and socially integrated societies tend to experience better health outcomes.³¹⁹ Social cohesion has been defined as the “extent of connectedness and solidarity among groups in society”.²⁹ Social capital has been defined as the interpersonal trust between citizens, norms of reciprocity, sense of community, and social participation and group membership that facilitates collective action and cooperation for mutual benefit.²⁸ Social capital can be viewed as a measure of the strength of social cohesion, so the richer a community’s social capital the stronger the social cohesion.^{31, 320} Social cohesion enhances the collective social capital of communities, which is related to increased physical activity behaviour.³⁰ Communities rich in social capital may be better able to reinforce positive social norms for physical activity behaviour and/or to increase a sense of safety in areas where individuals are likely to engage in physical activity.³⁴ Social capital may also influence physical activity through psychosocial processes like social support.³⁴

Cleland et al²⁷⁵ and Ball et al²⁸ found that women were more likely to achieve recommended levels of leisure-time physical activity if they had high levels of social participation. Social participation was measured as a frequency of: 1) informal social participation (i.e., visiting family, friends or neighbours), 2) social participation in public spaces (e.g., cafe/restaurant, social club, theatre or cinema) and 3) social participation in group activities (e.g., played a team sport, attended a gym or exercise class, involvement in a hobby or self-help group). Ball et al²⁸ also found that women who had higher levels of community connectedness (i.e., knew more neighbours), interpersonal trust, norms of reciprocity and social cohesion, more often reported to engage in leisure-time physical

activity. The level of trust in people within the neighbourhood can furthermore influence the time spent on walking for leisure among mothers³⁴.

Women have expressed frustrations regarding the lack of government support for physical activity.²⁵⁰ A study among Indigenous women in Australia also found support from government agencies to be an important determinant of physical activity behaviour.²⁵⁷ A study in Sydney showed the ways in which government support can have a positive impact on women's physical activity habits and how these projects can lead to more positive communication channels between government and community and a strengthened sense of community.²⁸⁸

These findings suggest that social capital may be an important determinant of physical activity among women. However, evidence is limited with no evidence in relation to pregnant and postpartum women. More research on social capital as a determinant of physical activity among women is needed.

4.2.3.2 Neighbourhood Factors

Characteristics such as neighbourhood deprivation, presence or lack of neighbourhood resources such as grocery stores, and perception of crime are commonly measured neighbourhood factors.³⁴ This review categorised neighbourhood deprivation and neighbourhood resources under the physical environment. Perceived crime was categorised under the social environment and is discussed in the next section in relation to its impact on physical activity behaviour.

Neighbourhood Safety: Perceived Crime

Reviews have shown that perceived crime may reduce physical activity behaviour in the general population.^{23, 30, 34, 312} Although one review concluded that there was insufficient evidence that crime-related safety influences physical activity behaviour,³¹¹ it did indicate that direct and indirect contact with crime can lead to a diffusion of fear through a community, which can decrease outdoor physical activity behaviour.³¹¹ This review also indicated that people who feel vulnerable (which may include pregnant women and

mothers) were more likely to be influenced by fear of crime. Table 4.22 provides an overview of the key findings related to perceived crime as a determinant of physical activity among women.

Table 4.22 *Key findings related to perceived crime as a determinant of physical activity among women*

Finding	Source
Women have mentioned that receiving verbal insults when attempting to be physically active outside, made them feel uncomfortable and unsafe	278
Women reported that having a safe and PA friendly neighbourhood, enabled them to be physically active	277
Feeling unsafe in own neighbourhood was associated with the presence of individuals or groups who engendered fear (e.g., gang members), which was reported as a barrier of PA	250
Pregnant and postpartum women also reported being less active, because they felt unsafe outside due low levels of trust and crime	248, 268, 283, 286, 291, 313
Both sufficiently and insufficiently active women mentioned perceptions of crime as reducing outdoor PA	244, 249, 253, 254, 276-278, 282, 284, 291, 294, 299, 302
No significant association was found between crime related safety and PA behaviour among women	28
During pregnancy, territoriality (i.e., fences or hedges, decorations, neighbourhood community watch, security warning, and no trespassing signs) had no significant influence on vigorous leisure activity	314

PA= Physical activity

Findings indicate that perceived crime may only be a significant determinant of physical activity among women who live in neighbourhoods with high crime rates. Laraia et al³¹⁴ investigated safety as a determinant of physical activity behaviour during pregnancy, however only investigated its effect on vigorous intensity physical activity, an unusual focus, considering mild and moderate intensity physical activity are much more common during pregnancy. More research is needed to find out the ways in which safety issues influence women's physical activity behaviour during pregnancy and postpartum.

4.2.4 Knowledge Gaps related to the Social Environmental Determinants of Physical Activity

Table 4.31 provides an overview of the results in this review in relation to the social environmental determinants of physical activity among women. Fifty-eight studies have been identified that described the influence of the social environment on women's physical activity behaviour. Thirteen studies were conducted within Australia, of which only four focused on pregnant women and mothers. Four studies were conducted in Queensland, however none of these studies included pregnant or postnatal women. More research on the impact of the social environment on women's physical activity behaviour during pregnancy and postpartum is needed in order to fill the gap in the published, peer-reviewed literature. One cannot assume that women within Queensland are the same as women in other states of Australia or other parts of the world, and thus more research is needed to identify the social environmental barriers to and enablers of Queensland women's physical activity behaviour during pregnancy and postpartum. Qualitative research should therefore be the first step in order to improve understanding of the ways in which the social environment influences pregnant and postpartum women's physical activity behaviour within Queensland. Since Queensland is a large state, social determinants such as physical activity related social norms and issues related to gender inequality are likely to vary throughout the state. It is therefore advised to investigate social environmental determinants on a small geographical scale.

4.3 Physical Environmental Determinants of Physical Activity

The physical environment consists of both the built and natural environment. The "built environment" has been defined as the combination of urban design, land use, and the transportation system, and encompasses patterns of human activity within the physical environment.⁴⁵ All potential physical environmental determinants of physical activity behaviour are presented in Table 4.23.

Table 4.23 *Physical environmental determinants of physical activity behaviour*

Determinants	General population	Women and mothers	Pregnant women
<i>Environmental aesthetics</i> (i.e., availability of green or open spaces and mixed land use, physical disorder, and level of appreciation)	2, 23, 305, 312, 321-324	250, 251, 275, 277, 278, 325	265, 268, 314
<i>Walkable and cyclable neighbourhood</i> (i.e., path availability, accessibility and connectivity, and walkable or cycleable destinations)	2, 23, 305, 312, 323, 324	225, 246, 249-251, 254, 277, 278, 284, 325	246, 265
<i>Exercise facilities and home equipment</i>	23, 305, 312, 321	246, 249, 250, 254, 256, 275-278, 284, 291, 302, 325	268, 283, 291, 296, 298
<i>Public transport</i>	2, 323	93, 247, 249, 250, 256, 277, 291, 302	265, 268, 291
<i>Neighbourhood safety</i> (traffic, street lights)	2, 312, 324	226, 249, 250, 254, 275, 277, 278, 284, 288	
<i>Weather conditions</i>	241	246, 254, 277, 278, 290, 291, 296, 299	265, 268, 291

Note: The numbers refer to research papers, which can be found in the reference list

4.3.1 Environmental Aesthetics

Subjective environmental aesthetics can be defined as the appreciation of the physical environment.¹ Objectively measured aesthetical characteristics in the neighbourhood include levels of cleanliness, variety of sights, and variety of building designs.² This review therefore includes the availability of green or open spaces, mixed land use and physical disorder as part of environmental aesthetics. Mixed land use involves a range of complementary land uses that are located together in a balanced mix, including residential development, shops, employment, community and recreation facilities, and parks and open spaces.³²⁶ Physical disorder refers to the number of abandoned buildings or vacant lots, and the presence of trash and graffiti, broken windows or abandoned cars on the street segment.²³ Table 4.24 provides a summary of the key findings in previous reviews related to environmental aesthetics as a determinant of physical activity in the general population.

Table 4.24 *Key findings related to environmental aesthetics as a determinant of physical activity in the general population*

Finding	Source
Pleasant aesthetics or green space appears to be positively correlated with PA behaviour. This correlation appeared to be stronger for women compared to men	23
Environmental aesthetics was only positively correlated with walking among men	305
Mixed land use may only be positively associated with moderate and moderate-to-vigorous PA among women	323
PA may be positively correlated with overall pleasantness of a specified area; presence of interesting things to see, presence of a well maintained community, presence of a garbage-free community and overall scenery	312
Park access was positive correlated with PA behaviour. Women, who mentioned their neighbourhood was aesthetically pleasing, were more likely to report walking. Those living in coastal areas were significantly more likely to report vigorous exercise and significantly less likely to be inactive	321
There is evidence that both objective and subjective aesthetics are positively associated with walking	2
The evidence in regard to the correlation between green space and overall PA appears to be ambiguous. However, there seems to be some evidence for a positive correlation between green space or open space and walking	322
Those who reported higher mixed land use and more pleasing aesthetics appeared to be more active. Living within walking distance from a park appeared to be positively correlated with walking	324
Residents in communities with more mixed land use reported higher rates of walking and cycling than residents from communities with opposite characteristics	305
Although the association between mixed land use and total walking was ambiguous, there seemed to be sufficient evidence to suggest a positive association between mixed land use and walking for transport	323

PA= Physical activity

Although these findings show some inconsistency, there seems to be sufficient evidence to suggest that environmental aesthetics may be a significant determinant of walking in the general population. Previous research also investigated environmental aesthetics as a determinant of physical activity behaviour among specific groups of women. Table 4.25 presents the key findings related to environmental aesthetics as a determinant of physical activity among women.

Table 4.25 *Key findings related to environmental aesthetics as a determinant of physical activity among women*

Finding	Source
Women mentioned unpleasant aesthetics to be a barrier to PA	250
African American women expressed that having a backyard or acreage around the home and having a park in close proximity served as facilitators of PA	277
African American women reported a lack of parks and poorly equipped or inadequately maintained parks as barriers to PA	278
During pregnancy, only the availability of parks or the lack thereof were mentioned to impact PA behaviour	265, 268
Women with access to interesting local walks were more likely to be active	275
Women, who did not engage in any pre-pregnancy or first trimester vigorous leisure activities, lived in neighbourhoods with a significantly higher mean score for the presence of physical disorder. However, the presence of parks, sidewalks, porches, presence of people, and presence of non-residential visitors had no significant association with vigorous leisure activity	314
Women's PA behaviour was not significantly correlated with any measures of the built environment	251, 325

PA= Physical activity

Findings indicate that although qualitative studies suggest environmental aesthetics to be related to physical activity behaviour among women, quantitative research was limited and ambiguous. In addition, findings related to pregnant women were limited and findings related to postpartum women were lacking. More research is therefore needed on whether environmental aesthetics influences women's physical activity behaviour during this life phase, and the ways in which this potentially occurs.

4.3.2 Walkable and Cyclable Neighbourhood

For the purposes of this review walkable and cyclable neighbourhoods are defined as neighbourhoods that have high path availability, accessibility and connectivity and are within walking or cycling distance from destinations. Table 4.26 provides a summary of the key findings in previous reviews related to walkable and cyclable neighbourhoods as determinants of physical activity behaviour in the general population.

Table 4.26 *Key findings related to walkable and cyclable neighbourhoods as determinants of physical activity in the general population*

Finding	Source
Residents living in neighbourhoods with better path and sidewalk availability and connectivity, appeared to be more active for transport related purposes	324
Sprawl was found to be characterised by low density, poor connectivity, and segregated land uses, which appeared to be a barrier to PA	23
Well-maintained sidewalks and paths support PA in disadvantaged populations	23
Not having any paths within a 10 min walking distance was significantly correlated with inactivity	312
In urban areas, people who lived in areas with walkable destinations were more likely to be physically active	312
Grocery stores and restaurants may be particularly attractive walking destinations, suggesting that these may influence PA for transport purposes	23
Availability, accessibility and convenience of destinations as well as the general functionality of the neighbourhood (e.g., the presence of sidewalks) were positively associated with PA	2
Walkable neighbourhoods only predicted walking in 47% of the studies under review. This variable also seemed to be more likely to influence PA behaviour among women compared to men	323
A significant association was only found between availability of paths and PA when measures of moderate and vigorous PA were combined	305

PA= Physical activity

These findings suggest that walkable and cyclable environments hold significant determinants of physical activity behaviour in the general population and perhaps among women as well. This association was, however, stronger for active transport than leisure physical activity. Table 4.27 provides an overview of the key findings related to walkable and cyclable environments as determinants of physical activity among women.

Table 4.27 *Key findings related to walkable and cyclable environments as determinants of physical activity among women*

Finding	Source
Pregnant and non-pregnant women have expressed that lack of sidewalks restricted their PA behaviour, especially in high traffic areas	249, 250, 254, 265, 277, 278, 284

American-Indian and rural Caucasian women indicated that unpaved, gravel or uneven footpaths were also perceived as PA barriers	254, 284
Proximity to destinations/facilities such as a skating rink, a running track near a church or school, a zoo, and a mall emerged as an important determinant of PA behaviour	277, 278
Participants mentioned that neighbourhoods had to be convenient for walking and footpaths had to be connected to destinations	278
Pregnant women mentioned access to footpaths and proximity to destinations as facilitators of PA behaviour	265
Women in neighbourhoods with sidewalks were more likely to meet the PA recommendation compared to women who reported an absence of sidewalks	225
Lack of sidewalks was a very uncommon barrier and did not significantly predict women's PA behaviour during pregnancy and the postnatal period	246
Women's PA behaviour was not significantly correlated with any measures of the built environment	251, 325

PA= Physical activity

According to qualitative studies, living close to destinations or facilities and the presence of sidewalks appeared to be significant determinants of physical activity behaviour among nulliparous women, pregnant women and mothers. Quantitative research, however, shows inconsistent results in regard to the impact of sidewalks on women's physical activity behaviour. Whether there is a possible association between walkable environments and physical activity is especially unclear during pregnancy and postpartum as only limited evidence was available. Walkable environments may not have a significant independent effect on their physical activity behaviour, due to experienced personal and social struggles (see Chapter 4, sections 4.1 and 4.2). More research is therefore needed on the effect of walkable environments on physical activity behaviour among specific groups of women such as mothers, pregnant and postnatal women.

4.3.3 Exercise Facilities and Home Equipment

Availability of exercise facilities in the neighbourhood and physical activity equipment at home have been previously investigated as determinants of physical activity behaviour. Table 4.28 provides a summary of the key findings in previous reviews related to exercise facilities and equipment as determinants of physical activity behaviour in the general population.

Table 4.28 *Key findings related to exercise facilities and equipment as determinants of physical activity in the general population*

Finding	Source
Convincing evidence was found for a positive association for availability of PA equipment at home and vigorous PA and sports in both men and women. A possible positive association between convenience of PA facilities and moderate-to-vigorous PA, vigorous PA and sports in men and women were also identified	305
During pregnancy, African-American women expressed frustration with a lack of or poorly maintained parks, walking tracks and swimming pools as it encumbered PA by themselves and with their family	298
Findings related to indoor and outdoor PA facilities and PA behaviour are inconsistent. Availability of indoor PA facilities may only be a significant facilitator of PA among those with higher incomes	312
Proximity to PA facilities may not be sufficient to affect PA, especially when additional barriers such as cost, restricted operating hours, or poor facility maintenance are present	23
PA facilities and PA equipment at home appeared to have a significant influence on PA behaviour. Presence of home equipment was associated with strength-building and vigorous exercise, and convenience of PA facilities was associated with strength-building exercise, but appeared to be more significant among men	321

PA= Physical activity

Findings show that the association between exercise facilities or equipment at home and physical activity appears to be ambiguous, especially among women. This ambiguity appears to be due to the many mediating factors involved such as costs, operating hours and maintenance. Table 4.29 provides an overview of the key findings related to exercise facilities and home equipment as determinants of physical activity behaviour among women.

Table 4.29 *Key findings related to exercise facilities and home equipment as determinants of physical activity among women*

Finding	Source
Women and mothers mentioned the lack of available PA facilities as a barrier to PA	249, 277, 278, 284, 291, 302
Women and mothers reported the lack of conveniently located PA facilities as a barriers to PA	254, 256, 277, 278, 284, 291

African American women mentioned the lack of affordable PA facilities as a barrier to PA	254
African American women mentioned the lack of safe PA facilities as a barrier to PA	302
Mexican women mentioned the lack of language appropriate exercise classes as a barrier to PA	250
American Indian women indicated inconsistent or inconvenient opening hours, lack of qualified personnel, irregular classes or programs as barriers to using PA facilities	254
Caucasian women have mentioned that the available PA facilities were all geared towards men and expressed a need for a place to exercise, specifically for women	284
Having exercise equipment such as a treadmill at home was mentioned as an enabler of PA among women	277
Pregnant women mentioned a lack PA facilities as a barrier to PA	268, 291, 296
Pregnant women mentioned inconveniently located PA facilities to be a barrier to PA	291
A lack of appropriate PA facilities contributed to women's tendency to decrease PA as pregnancy progressed	270

PA=Physical activity

The qualitative findings suggest that exercise facilities (if convenient, affordable, safe and accessible throughout the day and early evening) may be a significant determinant of physical activity behaviour among women. Due to limited evidence no suggestions can be made related to home equipment as a determinant of physical activity behaviour among women, based on qualitative research. However, quantitative studies have also investigated exercise facilities and home equipment as determinants of physical activity behaviour among women. Table 4.30 provides a summary of these quantitative findings.

Table 4.30 *Quantitative evidence regarding exercise facilities and home equipment as determinants of physical activity among women*

Finding	Source
Among socio-economic disadvantaged women, access to places to be vigorously active was not a significant determinant of PA. However, having a sport or recreation club membership was a significant facilitator of PA	275
A study among Latina immigrants indicated that having access to indoor or outdoor places to exercise was associated with PA	276
Among minority women, the association between availability of free or low-cost PA facilities in the neighbourhood and PA only neared significance	325

Lack of PA facilities or exercise classes was not a significant barrier to PA among pregnant and postpartum women	246, 283
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Availability of home PA equipment or access to PA equipment, exercise TV channels, access to convenient PA facilities or the possibility to be active at work, were not commonly mentioned and did not significantly predict postpartum PA	246
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PA= Physical activity

There seems to be some evidence to suggest that the availability of exercise facilities may predict physical activity behaviour among women, but there is not enough evidence to make any final conclusions in relation to pregnant and postpartum women. Findings in relation to pregnancy were inconsistent and no qualitative or quantitative studies were identified that addressed the availability of exercise facilities as a significant determinant of postpartum physical activity. In addition, its impact also appears to be influenced by demographic characteristics such as age, culture and income, and also by facility related factors such as proximity, costs, women friendliness of the facility, operating hours and maintenance.

4.3.4 Transport

Reviews of general population based studies show inconsistent results in regard to the association between public transport and physical activity. Durand et al³²³ reviewed transit-oriented and transit-friendly developments, integrating multimodal use and connectivity (e.g., park and ride lots, and transit centres), availability of or proximity to transit stops and convenient access to good quality public transport systems. Findings showed inconsistencies in regard to total walking time. However, in regard to recreational walking, a significantly positive correlation was found only among women.³²³ Another review confirmed that public transport has been positively associated with walking for transport near home.² However, a different review concluded that convenience of public transport was not associated with any type of physical activity (i.e., general physical activity, moderate and vigorous activity, walking, and cycling).³⁰⁵

In qualitative studies among women, a lack of access to transportation has been mentioned as a barrier to physical activity,^{93, 247, 249, 250, 277, 282} such as a lack of bus service,

car or driver's licence. Some women also mentioned that having a car meant less physical activity.²⁷⁷ Pregnant and postnatal women have also addressed the lack of transportation as a barrier to physical activity.^{265, 268, 291}

It can be concluded that a lack of public transport is likely to reduce the opportunity for walking for transport purposes among women. The presence of a car may decrease walking for transport, yet may increase women's physical activity via improved accessibility to indoor and outdoor exercise facilities. However, more research on transport as a determinant of physical activity among women is needed, especially among pregnant and postnatal women.

4.3.5 Neighbourhood Safety: Traffic and Street Lights

General populations based reviews show some evidence to support heavy traffic as a significant barrier to physical activity and light traffic or perceived safety from traffic to have a positive association with regular walking.³¹² Presence of streetlights was also found to be positively associated with transport related physical activity, and verge width (which increases pedestrian safety by separating pedestrians from motor vehicles) may also have a significantly positive effect on walking for recreation². However, one review concluded that a significant association between street lights and physical activity was absent,³¹² while another review concluded that there was not enough evidence to make any statements in relation to the influence of traffic calming on leisure-time or transport physical activity.³²⁴

Qualitative studies among women showed that heavy traffic and lack of separate footpaths was often reported as a barrier to physical activity.^{249, 250, 277, 278, 284} Low-traffic country roads were perceived as facilitators of walking.²⁷⁸ A quantitative study among women also showed that having to cross busy roads when walking was a significant barrier to leisure-time physical activity.²⁷⁵

A lack of street lights has been mentioned by women as an important barrier to physical activity.^{250, 278, 284, 288} A quantitative study showed that less than one-fifth of all women felt safe when walking at night and more than 50% mentioned a lack of streetlights as a

contributing factor,²⁸⁸ but failed to measure whether the lack of streetlights had a significant effect on their physical activity behaviour. However, another study found that streetlights and traffic were not significant determinants of women's physical activity behaviour.²²⁶

It can be concluded that it is unclear whether traffic or street lights have any effect on women's physical activity behaviour and no studies among pregnant or postpartum women were identified that reflected on these issues. This therefore requires further investigation.

4.3.6 Weather Conditions

A review in the general population concluded that poor weather conditions seem to have a direct negative effect on physical activity participation in both active and relatively inactive people.²⁴¹

Qualitative studies also found that unfavourable weather conditions also prevented women and postpartum women,^{254, 277, 278, 282, 290, 291, 296, 299} and pregnant women^{265, 268, 291} from being active. Caperchione et al²⁹⁹ found that Australian women commonly mentioned that their walking was restricted due to hot, humid and wet weather conditions during summer, which was especially mentioned by participants who originally came from cooler climates. Cold weather conditions during winter were also voiced to restrict physical activity.²⁹⁹

During pregnancy and postpartum hot and cold weather conditions have been mentioned to restrict women's physical activity behaviour,^{265, 268, 291, 296} while pleasant weather acted as a facilitator of physical activity.²⁶⁵ However, a quantitative study showed that weather conditions was a non-significant determinant of women's physical activity behaviour during the postnatal phase.²⁴⁶

Hot and humid climates can be a significant barrier to physical activity among pregnant women, because women are warned during pregnancy not to overheat themselves as it can potentially have a negative effect on the foetus. However, the impact of weather

conditions on postnatal physical activity behaviour is unclear. More research is therefore required.

4.3.7 Knowledge Gaps

There is some evidence that the physical environment is a correlate of physical activity behaviour among women. However, it has received less empirical attention compared to individual and social environmental factors. Twenty studies were identified that focused on the relationship of physical environmental determinants of women's physical activity behaviour. Eleven studies included Caucasian, Aboriginal or Torres Strait women. Only two studies were conducted in Australia. None of these studies focused on pregnant or postpartum women, and none were conducted in Queensland.

It seems that limited published, peer-reviewed evidence exists that explains the influence of the physical environment on pregnant and postnatal women's physical activity behaviour within Queensland. Qualitative research should therefore be the first step in order to improve understanding of the ways in which the physical environment influences Queensland women's physical activity behaviour during this particular phase in their life. In addition, since Queensland consists of many different types of land (e.g., coastal areas, hinterland and outback) and other physical environmental characteristics, physical environmental determinants should be investigated on a small geographical scale.

4.4 Chapter Conclusion

Table 4.31 provides a total summary of the literature review findings. When looking at all the determinants of women's physical activity behaviour in the personal, social and physical environment that have been previously discussed, it can be suggested that during pregnancy and the postnatal phase, the physical environment may be of less significance. However, more research is required to make any definitive conclusions regarding individual, social and physical environmental factors and their influence of women's physical activity behaviour during pregnancy and postpartum living in Queensland.

Table 4.31 Summary Findings Literature Review: Determinant analysis

Level according to Socio-Ecological model	Determinant	Results Literature Review
Individual	Attitude	?
	Behavioural beliefs	p,4,n&m
	Intention	2,3,n&m
	Motivation	p,4,n&m
	Knowledge	p,4?,n&m?
	Self-efficacy: barrier self efficacy and self-regulatory efficacy	1,2?,3?,4,n&m
	Sickness	p
	Physical discomfort	p
	Tiredness	p,4,n&m
	Priority	p?,4,n&m
	Self-esteem & body image	3?,n&m
Social environmental	Social networks	p?,4?, n&m?
	Social support:	
	<i>Emotional support and instrumental support from partner, family and friends</i>	p,4,n&m
	<i>Emotional support and instrumental support at work</i>	w
	<i>Companionship and social interaction</i>	p,4,n&m
	<i>Informational support</i>	p,4
	Social inequality:	
	<i>education and work inequality</i>	?
	<i>income inequality and costs of PA and childcare facilities</i>	p?,4?,n&m
	<i>racial inequality</i>	?
	<i>Gender inequality:</i>	
	<i>Social norm in relation to PA</i>	p,4,n&m
	<i>Gender role expectations</i>	m
	<i>Lack of time</i>	p,4,n&m
	<i>Social role strain</i>	p*,4?,m
Social cohesion & social capital	n&m?	
Neighbourhood Safety: Perceived crime	?	
Physical environmental	Aesthetics	p?,n&m
	Neighbourhood walkability	p?,4?,n&m

	<i>Proximity to facilities such as shops, cafés and library</i>	n&m
	Availability of and proximity to PA facilities	p?,4?,n&m
	Home PA equipment	NS
	Transport	p?,4?, n&m
	Neighbourhood Safety	?
	Weather conditions	p,4?,n&m

*p= pregnancy, n= nulliparous women , m= mothers, w= women, 1= 1st trimester, 2= 2nd Trimester, 3= 3rd trimester, 4= postnatal, PA= physical activity, ?= unclear, *= only significant among multigravidas*

In addition, some determinants were not investigated at all and therefore may need special attention. Determinants of physical activity that received no attention in relation to pregnant women included: support at work, perceived crime, social inequality related to income, race and gender inequality, social cohesion and social capital, neighbourhood walkability, availability of home physical activity equipment, and neighbourhood safety (non-crime related). Determinants of physical activity that received no attention in relation to postnatal women included: intention; knowledge; self-esteem, body image, or self-worth; support at work (for obvious reasons); social inequality in relation to income, race and gender inequality; social cohesion and social capital; aesthetics, availability of and proximity to exercise facilities, availability of home physical activity equipment, and neighbourhood safety (non-crime related).

In summary, this review revealed gaps in the evidence base specific to physical activity intervention design during pregnancy and postpartum in the Queensland community context (see sections 4.1.9, 4.2.4 and 4.3.7), and provides a justification for specific target group orientated investigation of physical activity determinants during this life stage. Further justification, methodology and methods of the longitudinal study have been described in Chapter 3, section 3.4. Chapters 6, 7 and 8 discuss the findings of this investigation.

Chapter 5. Intervention review

5.0 Introduction

This chapter reviews published physical activity intervention studies that were effective in increasing physical activity among pregnant women and mothers. This review considers the determinants of physical activity behaviour, addressed within each intervention, as theoretical underpinnings. It also discusses the intervention strategies that were used to address each of these determinants.

The intervention studies in this review consisted of randomised controlled trials (RCTs) and non-RCTs (i.e., no control group and/or not randomised). These studies were published in journals of various disciplines: Women's Health (i.e., Women & Health, Women's Health Issues, and BMC Women's Health), Pregnancy and Childbirth (i.e., BMC Pregnancy and Childbirth), Preventive Medicine and Public Health (i.e., Health Promotion International, Preventive Medicine, American Journal of Preventive Medicine, Health Education & Behavior, BMC Public Health), Physical Activity (i.e., Journal of Physical Activity and Health Biomedicine), Nursing (i.e., Nursing Research, and Canadian Journal of Nursing Research) Psychology or Behavioural Medicine (i.e., British Journal of Health Psychology, and Annals of Behavioral Medicine), Nutrition (i.e., Journal of the American Dietetic Association), and Obstetrics and Gynaecology (i.e., BJOG: An International Journal of Obstetrics and Gynaecology). Appendix 3 and Chapter 3, section 3.3 provide more detail in relation to the intervention studies and the review process.

Identified determinants have been categorised according to the socio-ecological model, and are presented in Table 5.1. This chapter therefore contributes to the second research question: How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy and the first three postnatal months?, and also contributes to the fourth research question: What are the implications for future intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and the first three postnatal months? A comprehensive answer to the second and fourth research question is provided in Chapter 9.

Table 5.1 *Determinants addressed in previous effective physical activity intervention studies among women*

Level according to Socio-Ecological model	Determinant	Reference	Life stage
Individual	Behavioural Beliefs	327-333	4,n&m
	intention	329, 334, 335	4?,n&m?
	Motivation	12, 330, 332, 333, 336-342	p?,4?,n&m
	Knowledge	288, 328, 332, 333, 335-337, 339-341, 343-345	p?,4?
	Self efficacy: Barrier self-efficacy & self-regulatory efficacy	12, 327-345	p?,4?,n&m
	Body image and self-esteem	333	w?
	<i>self-worth</i>	333, 343	w?
Social environmental	Emotional support: encouragement	12, 288, 327-330, 333-336, 340, 341	p?,4?,n&m
	Companionship	288, 329, 341, 343-345	p?,4?,n&m?
	Informational support	288, 328, 332, 333, 335-337, 339-341, 343-345	p?,4?
	Instrumental support: exercise DVDs	330, 341	4?,m?
	social networks	288, 327-329, 333, 344, 345	p?,4?,n&m?
	Social cohesion and social capital	288	w?

PA= physical activity, p= pregnancy, m= mothers, n= nulliparous women, w= women, 4= postnatal, ?= unclear

5.1 Individual Determinants

The next eight sections describe the identified individual determinants (see Table 5.1) as theoretical underpinnings that have been addressed by previous interventions. These sections also describe what strategies were used to address these determinants. Although the identified interventions within this review were effective in increasing physical activity among women, it was often unclear which individual determinants (underpinning the interventions) contributed to this increase.

5.1.1 Behavioural Beliefs

Six intervention studies have been identified that aimed to improve behavioural beliefs in order to increase physical activity among women. These intervention strategies included: generating positive beliefs through small group discussions among women and postnatal women,^{327, 328} providing mothers with positive beliefs via SMS,³²⁹ developing realistic beliefs among postnatal women about the benefits of regular physical activity via tip sheets and email messages,³³⁰ or daily physical activity record holding.³³¹

Although Stadler et al³²⁸ and Fjeldsoe et al³²⁹ did not investigate changes in behavioural beliefs, Cramp and Brawley³²⁷ did study this change among postnatal women and found that the intervention group's beliefs regarding the likelihood of achieving their short term outcomes remained stable, while those of the control group deteriorated. However, Speck and Looney³³¹ did not find a significant difference in behavioural beliefs between women in the intervention and control group, but did find that behavioural beliefs approached statistical significance in its correlation with number of pedometer steps. Dunton and Robertson³³² did not focus specifically on behavioural beliefs. However, it can be speculated from their findings that beliefs related to short term outcomes can be more effective in bringing about change in women's physical activity behaviour compared to long term outcomes. This last finding was also identified in the literature review (see Chapter 4, section 4.1.1.1).

It can be concluded that behavioural beliefs can be a significant determinant of physical activity among women, mothers and postnatal women. However, this determinant was not addressed within interventions among pregnant women. Therefore, no final conclusions can be drawn in relation to behavioural beliefs as a determinant of antenatal physical activity. The literature review in Chapter 4 showed that behavioural beliefs related to safety concerns, priorities and benefits may be significant determinants of physical activity among pregnant and postnatal women. It is therefore suggested that this determinant should be addressed in future physical activity interventions among pregnant and postnatal women.

5.1.2 Intention

Three intervention studies have been identified that attempted to incite intention via implementing cues to action or reminders to be physically active by sending their postpartum and maternal participants reminders about physical activity via SMS^{329, 334} or providing mothers with a goal-setting refrigerator magnet,³²⁹ so they would be reminded of their physical activity goals every time they walk into the kitchen. Pal et al³³⁵ included a pedometer in order to provide women with a cue or prompt for physical activity. A pedometer was found to function as a cue only when instructed to accumulate a certain number of steps per day. Fjeldsoe et al³²⁹ reported that mothers nominated the goal-setting refrigerator magnet as the most helpful component of the intervention, because it acted as a constant visual reminder, which incited their intention to exercise.

Inciting intention may therefore be a significant determinant of physical activity among women, mothers and postnatal women, however, no intervention study was identified that focused on increasing intention for physical activity during pregnancy. Also, none of the identified intervention studies investigated intention or its relationship with physical activity behaviour. Therefore, no final conclusion can be made in relation to intention as a determinant of women's physical activity behaviour.

5.1.3 Motivation

Ten physical activity intervention studies have been identified that attempted to increase motivation to be active among women by incorporating the stages of change concept according to the transtheoretical model (TTM).³⁴⁶ These interventions were tailored to different stages of motivational readiness. The aim was to stimulate women, mothers, pregnant and/or postnatal women towards engaging in physical activity.^{12, 330, 332, 336-342} The TTM has been explained in the glossary. The stages of change concept was addressed by providing antenatal and postnatal participants with stage-matched information including motivationally targeted materials;^{330, 336} frequently sending a motivational SMS to mothers,³²⁹ sending emails and/or newsletters tailored to (postpartum) women's motivational readiness to become more active;^{330, 332} focusing on overcoming psychological barriers;^{337, 339} stage based counselling and discussions;^{330, 338} and environmental reevaluation.¹² In order to increase environmental reevaluation,

participants were encouraged to think about how a mother's physical activity behaviour can benefit the whole family.¹² Serving as a positive role model for children was emphasised.

Even though in all interventions physical activity behaviour had significantly increased in the intervention group, results regarding stages of change or processes of change were inconsistent. Clarke and Gross³⁴¹ found that participants who had significantly increased their motivational readiness to become active, had a higher pedometer step count compared to those who had not increased their motivational readiness. Fahrenwald et al¹² and Purath et al³³⁸ found that participants in the intervention group had significantly more stage progression than the control group. Chasan-Taber et al³³⁶ found that in relation to pregnant women, the intervention and control group significantly differed in terms of behavioural processes of change, with the intervention group showing improvement, while the control group experienced a decrease. However, there was no significant difference between both groups in regard to cognitive processes of change. Collins et al³³⁷ and Dunton and Robertson³³² found no significant improvement in stage progression within the overall intervention group. Lewis et al,³⁴² Urizar et al³³⁹ and Albright et al^{330, 340} did not investigate progression in stages of change.

Motivation appears to be a determinant of physical activity behaviour among women and mothers. Therefore, including motivation focused intervention strategies and tailoring physical activity interventions to specific stages of motivational readiness, hold the potential to improve intervention effectiveness among women. However, it is unclear whether motivation is also a significant determinant of physical activity among pregnant and postnatal women as sufficient evidence was lacking.

5.1.4 Knowledge and Informational Support

This section describes the individual determinant knowledge together with the social environmental determinant informational support, as separation often leads to overlap and confusion. Twelve intervention studies have been identified that aimed to increase knowledge via improving informational support among women as one of the intervention strategies. Interventions included information about general physical activity

guidelines^{328, 335, 337, 339-341, 345} or antenatal and postnatal adjusted guidelines;^{336, 344, 345} information about cardio-vascular diseases and type 2 diabetes;³⁴⁰ tips for physical activity behaviour modification;³⁴¹ stretching tips and benefits of physical activity during pregnancy;³³⁶ correcting misconceptions about physical activity;^{337, 339, 340} health and social benefits of physical activity;^{288, 328, 337, 339, 340} websites and emails including physical activity and other health behaviour promoting information;³³² and/or a pregnancy adjusted exercise instruction video.³⁴⁴ One study aimed to educate women about the importance of physical activity, the difference between physical activity and exercise, the FITT (fitness, intensity, time, and type) principles, how to structure one's own personalised program that includes cardiovascular, muscular strength, endurance and flexibility components, and how to perform these activities at home or in a gym setting.³⁴³

Although 10 studies^{288, 332, 335, 336, 339-341, 343-345} did not investigate the changes in physical activity related knowledge and its impact on women's physical activity behaviour, two intervention studies did report on these changes. However, these studies did not include pregnant or postnatal women. Collins et al³³⁷ investigated changes in physical activity related knowledge among participating mothers, which showed no significant improvement compared to pre-course measurements. Stadler³²⁸ found that participants who only received information were less active at post-intervention compared to the information plus self-regulation group. Huberty et al³⁴³ did not measure knowledge, but an additional study showed that at 1 year follow up, physical activity had returned to baseline levels despite the fact participants were more knowledgeable about physical activity.³⁴⁷

These findings indicate that knowledge is not likely to be a significant determinant of women's physical activity behaviour, but may be significant during pregnancy and postpartum. However, due to the lack of intervention studies that investigated the correlation between change in knowledge and physical activity behaviour, no final conclusions can be drawn. It is furthermore advised that if prior investigation shows a lack of knowledge among pregnant and postnatal women, informational support should still be included as one of the strategies within the overall intervention.

5.1.5 Self-efficacy: Barrier Self-efficacy and Self-regulatory Efficacy

Nineteen physical activity intervention studies have been identified that included strategies that focused on improving physical activity self-efficacy, barrier self-efficacy and/or self-regulatory efficacy in order to increase women’s physical activity levels. Physical activity self-efficacy has been defined as the confidence a person has in engaging in regular physical activity.⁶ Physical activity self-efficacy consists of barrier-self efficacy and self-regulatory self-efficacy. Barrier self-efficacy can be viewed as the level of confidence a person has in overcoming barriers to physical activity. Self-regulation is defined as self-generated thoughts, feelings, and actions, which are systematically oriented towards attainment of goals.²² Physical activity self-regulatory efficacy can therefore be seen as the confidence an individual has in generating thoughts, feelings and actions that are oriented towards increasing physical activity behaviour to a desired level. Table 5.2 provides an overview of strategies related to physical activity self-efficacy or specific components of self-efficacy: barrier-self-efficacy and self-regulatory efficacy. These strategies were mainly used to increase physical activity behaviour among non-pregnant women, but some were also used to increase physical activity among pregnant women^{336, 342} and postpartum women.^{334, 345}

Table 5.2 *Strategies related to different types of physical activity self-efficacy*

Determinant	Strategies
Self-efficacy	brainstorm realistic expectations ³²⁷
Self-regulatory efficacy	develop self-monitoring and daily PA record holding skills ^{327, 330, 331, 334, 343, 344} ; provide pedometers ^{334, 335, 340, 341} ; develop skills to schedule PA ^{327, 342} ; develop skills to develop a tailored PA program ^{337, 339, 340, 343, 345} ; develop goal setting skills ^{12, 327-329, 336-343}
Barrier self-efficacy	develop skills to identify and overcome PA barriers ^{328, 330, 332, 336, 337, 339-341} ; identify supportive others and needed types of support ^{12, 341, 342} ; increase PA commitment ^{329, 337, 339, 340}

PA=Physical activity

Four intervention studies found that physical activity self-efficacy, barrier self-efficacy or self-regulatory efficacy had increased significantly more in the intervention group compared to the control group.^{12, 327, 328, 341} Three of these studies found these concepts to be positively correlated with women's or postnatal women's physical activity behaviour.^{327, 328, 341} An intervention study that only focused on self-regulation found self-reported minutes of moderate-to vigorous physical activity per week to be twice as much in the intervention compared to the control group.³²⁸

However, four other studies did not find a positive correlation between these concepts of self-efficacy and physical activity behaviour among women. Chasan-Taber et al,³³⁶ and Dunton and Robertson³³² found that although the intervention group was significantly more active post-intervention, physical activity self-efficacy had not increased within this group and did not significantly differ from the control group. Collins et al³³⁷ found that the level of self-efficacy at the end of the study did not significantly differ from baseline measurements. Speck and Looney³³¹ even found that physical activity self-efficacy decreased significantly more in the intervention compared to the control group. However, self-efficacy did not correlate with women's physical activity behaviour.

In addition, some studies only observed the effect of the overall intervention on physical activity behaviour and therefore did not focus on the specific contribution of physical activity self-efficacy, barrier self-efficacy, or self-regulatory efficacy.^{288, 329, 330, 334, 338-340, 342-345} Although Fjeldsoe, Miller and Marchall³²⁹ did not report on changes in self-regulatory efficacy or physical activity self-efficacy, it was reported that participants perceived the goal-setting magnet as the most helpful component of the intervention. Pal et al³³⁵ reported that participants walking with a pedometer, instructed to accumulate 10,000 steps per day, walked more than women who walked with a blinded pedometer, who were instructed to accumulate 30 minutes of walking per day. Tools that assist in self-regulation and hold track of physical activity behaviour may be effective facilitators of physical activity behaviour among women.

Self-regulatory efficacy and barrier self-efficacy seem to be important determinants of physical activity behaviour among women and mothers. Future interventions should therefore continue to provide women with tools for self-regulation and with tools to

overcome physical activity barriers common to women. However, more intervention research is needed among pregnant and postnatal women as evidence was limited.

5.1.6 Self-worth

Self-esteem was defined in 4.1.8 as “the experience of being competent to cope with the basic challenges of life and being worthy of happiness and the sum of self-confidence (i.e. a feeling of personal capacity) and self-respect (i.e. a feeling of personal worth)”.²⁶ Selfworth has been defined as a sense of self-respect and personal worth.²⁶ Although some use the terms self-esteem and self-worth interchangeably, these definitions show that self-worth is a part of self-esteem.

Two interventions were identified that aimed to improve self-worth.^{333,343} However, only the intervention study conducted by Huberty et al³⁴³ is discussed here. The intervention conducted by Segar, Jayaratne and Hanlon³³³ is discussed in section 5.3 as this intervention stood out from the others and is therefore described on its own.

The intervention conducted by Huberty et al³⁴³ consisted of a book club in which books related to self-worth, physical activity participation, wellness, mindfulness, and women specific concerns were discussed in group meetings.³⁴³ Although self-worth increased from baseline to post-intervention, the correlation between self-worth and physical activity behaviour was not investigated. The one year follow up showed that although self-worth was still improved, physical activity had returned to baseline levels.³⁴⁷

It must be noted that the participants within this intervention consisted of a sample of women with a mean age of 53. The fact that study did not find a significant correlation between self-worth and physical activity may therefore not relate to pregnant women or women with babies or young children. Further research is needed to establish whether self-worth is a significant determinant of physical activity among pregnant and postpartum women, and also to find out how to effectively address this determinant in order to increase physical activity within these groups of women.

5.2 Social Environment

Of the 20 intervention studies reviewed, 18 studies included strategies that considered the social environment. This section discusses how previous physical activity interventions addressed emotional support, companionship, instrumental support and social capital. Table 5.1 provides a summary of these addressed determinants.

5.2.1 Emotional Support: Encouragement

Ten studies have been identified that aimed to increase encouragement for physical activity. Strategies used to address this determinant included: telephone counselling, which included supportive feedback regarding the accomplishment of physical activity behaviours among women and postnatal women;^{330, 334, 340} assistance in identifying supportive others and the type of support needed among mothers;^{12, 341} regular SMS remind the nominated support person of their duty to provide physical activity support;³²⁹ face-to-face advice about how to establish encouragement for physical activity from others;³³⁵ provision of a manual that includes tips on building social support for new physical activity patterns for pregnant and postnatal women;^{330, 336} group discussions on generating positive physical activity beliefs;^{327, 328} and the organisation of community walking events.²⁸⁸ Purath et al³³⁸ offered an intervention program for working women within a university. Participants received support via a counselling session in which they were encouraged to be more active and set physical activity goals, and a follow-up phone call to discuss progress. Although Speck and Looney³³¹ and Collins et al³³⁷ investigated changes in social support, they did not include any social support specific strategies in the intervention.

In regard to the correlation between social support and physical activity, results were inconsistent. Fahrenwald¹² showed that social support from both family and friends had increased significantly more in the intervention compared to the control group. However, the effect of this increase on participants' physical activity behaviour was not investigated. Collins et al,³³⁷ however, found a significant increase in perceived social support for physical activity, and that changes in social support from friends were significantly correlated with minutes walking. According to Fjeldsoe,³²⁹ participants perceived the supportive SMS to be effective in prompting them to exercise as it kept

them goal focused. Although changes in social support and its effect on mothers' physical activity behaviour were not quantified, the support persons did not seem to have incited physical activity behaviour change within the participants. This was generally because they already received support from this person before the intervention or because the person was not able to provide much support, because they experienced similar barriers such as time constraints.³²⁹ Speck and Looney³³¹ did not find a significant difference in social support from family and friends in the intervention compared to the control group, and other studies among nulliparous women, mothers, pregnant women and postnatal women did not investigate changes in social support and its correlation with physical activity.^{288, 327, 328, 330, 334-336, 340}

This body of evidence shows that emotional support can be a significant determinant of physical activity behaviour among nulliparous women and mothers. However, more intervention research is needed in relation to pregnant and postpartum women. Trying to motivate friends and family to offer support could be effective, but may be difficult as they are likely to experience similar barriers (e.g., lack of time, etc.). Telephone counselling or support via SMS may be more effective and time-efficient, but more research on the effectiveness of different social support strategies is needed in order to establish which one is most effective in increasing physical activity behaviour among nulliparous women, mothers, antenatal and postnatal women.

5.2.2 Companionship, Social Networks and Instrumental Support

Six studies were identified that focused on increasing companionship and improving women's social networks in order to increase physical activity among nulliparous women, mothers, pregnant and/or postnatal women. Strategies included: walking events,²⁸⁸ informing women about free walking groups,³²⁹ and providing new exercise classes^{288, 344, 345} and walking groups.²⁸⁸ However, the influence of attending such exercise classes, groups or events on women's overall physical behaviour was not investigated. Other social network strategies included increasing local government involvement in facilitating physical activity and addressing environmental and other barriers,²⁸⁸ developing supportive networks and a collective identity,³³³ focusing on the centrality and continuity of relationships throughout women's lives,³³³ and organising group discussions on

generating positive physical activity beliefs.^{327, 328} Wen et al²⁸⁸ reported the council to acknowledge the intervention's contribution to more positive communication channels between council and community, however its impact on physical activity behaviour was not measured. The impact of the remaining social network strategies on physical activity behaviour was not measured either.

In relation to instrumental support, two intervention studies^{330, 341} provided postnatal women and mothers with exercise DVDs in order to increase their physical activity behaviour. However, the effect of this intervention strategy was not evaluated.

It can be concluded that the effect of companionship and social network on physical activity behaviour among women is unclear and therefore needs further investigation before any final conclusions can be drawn. There was also not enough evidence to draw any conclusions in relation to the provision of exercise DVDs as a strategy to improve instrumental support and physical activity behaviour among women.

5.2.3 Social Cohesion and Social Capital

Only one study was identified that addressed, to some degree, social cohesion and social capital.²⁸⁸ This intervention included strategies to improve local government involvement in the formative stages of the project by: using their facilities such as meeting rooms as frequent as possible; using their provided printed envelopes for distribution of project material; involving their parks designer in matters such as the organisation of community events to ensure these events coincided with the completion of parks and foreshores. The local government's involvement increased during the intervention which was suggested (but not measured) to have contributed to the significant increase of women's physical activity behaviour. Interviews with the members of the local government showed that their initial cautious attitude towards the project had shifted to enthusiasm as the project had increased their awareness about how physical activity events and the promotion of physical activity can contribute to more positive communication channels between the local government and community and to a strengthened sense of community.

Since only one study focused on increasing physical activity among women via improving social capital and cohesion through improving involvement from the local government, their significance as determinants of women's physical activity behaviour is unclear. However, it can be suggested that a sense of interconnectedness between local government and the community members provides opportunities for collaborative and sustainable action in order to increase physical activity among pregnant and postnatal women and the wider community.

5.3 Empowerment Theory, Objectification Theory, and Self-in-Relation Theory

There was one intervention that stood out from all others and is therefore described on its own. This intervention conducted by Segar et al³³³ was based on feminist theories: Empowerment Theory, Objectification Theory, and Self-in-Relation Theory. Empowerment Theory aims to facilitate people to engage as agents of change by building on strengths, challenging internalised negative self-evaluations, developing supportive networks and a collective identity, and taking planned action.³⁴⁸ It encourages individuals within a certain group to take responsibility and ownership regarding their educational process, define personal barriers and problems, develop their own programs and strategies, and challenge existing social structures that encumber physical activity.³⁴⁸ This theory addresses behavioural beliefs, knowledge/informational support, self-worth, barrier self-efficacy and self-regulatory efficacy, emotional support and social network, which have also been discussed in section 5.1.1, 5.1.4, 5.1.5, 5.1.6, 5.2.1 and 5.2.2.

Objectification Theory posits that within society, women are socially conditioned to have an observer's perspective as a primary view of their physical selves.³⁴⁹ This social conditioning results in women considering themselves as objects that are evaluated on the basis of their appearance.³⁴⁹ This theory focuses on motivation (see section 5.1.3) in that it tries to generate a shift in focus from external motivation (e.g., physical activity to become more attractive to others) to internal motivation (e.g., physical activity for improved wellbeing). It also addresses negative body-image and low self-esteem, which have been addressed in Chapter 5, section 5.1.6.

Self-in-Relation Theory “suggests a new model of development that accounts for the centrality and continuity of relationships throughout women’s lives, one that positions the “relational self” as the core self-structure in women”.³³³ This theory therefore addresses social networks, and emotional support.

The intervention conducted by Segar et al³³³ consisted of a six week workshop that focused on a combination of group discussions, consciousness-raising activities, written exercises, planning and strategising, and weekly evaluation. The novel component was the discussions of the importance of making time for self-care behaviour, being active in ways that are enjoyable, and accommodating convenient physical activities in daily life. At the follow-up (5-13 months post-intervention), results showed that light, moderate, vigorous and total physical activity had significantly increased as well as prioritisation of self-care and pleasure-based physical activity. Qualitative results also showed that the program made women accept the idea that all movement counts and that they became more proactive by searching for convenient opportunities to be active throughout the day. This indicates an increase in physical activity self-regulatory efficacy. However, it must be taken into consideration that the study did not include a control group and that participants were not pregnant, mostly Caucasian, highly educated, and middle-class. It is therefore unclear whether such workshop based interventions, would also impact physical activity among low educated women, women of other ethnic groups, and among pregnant and postnatal women.

These findings confirm previous findings in this chapter indicating that self-regulatory efficacy can be a significant determinant of physical activity behaviour among nulliparous women and mothers, however, cannot provide any further evidence in relation to its effect on pregnant and postnatal women’s physical activity behaviour. In relation to motivation, body image, self-esteem, self-worth, knowledge, informational support, emotional support, this study did not measure their significance as determinants of physical activity among women. However, this study did provide more context in terms of the ways in which to address such determinants in order to increase physical activity behaviour among women.

5.4 Chapter Conclusion

This chapter reviewed previously effective intervention studies among pregnant women and mothers, including both RCTs and non-RCTs. Table 5.1 summarised the determinants addressed within the reviewed intervention studies. It can be concluded that the individual and social environmental level hold significant determinants in relation to women's physical activity behaviour. Table 5.3 provides a summary of the strategies used within the reviewed intervention studies to address the determinants/theoretical underpinnings.

Table 5.3 *Intervention strategies used to address the determinants*

Level according to Socio-Ecological Model	Determinant	Intervention Strategy
Individual	Behavioural beliefs	<ul style="list-style-type: none"> • Generating positive PA beliefs through group discussions • Providing mothers with positive beliefs via SMS • Challenging negative self-evaluations • Developing realistic beliefs about the benefits of regular physical activity via tip sheets and email messages
	Intention	<ul style="list-style-type: none"> • Providing cues to action/reminders, such as text messages, and provision of goal-setting refrigerator magnets and pedometers
	Motivation	<ul style="list-style-type: none"> • Tailoring intervention to different stages of readiness • Sending motivational text messages and emails • Generating a shift in focus from external motivation to internal motivation • Providing tools to psychological barriers, • Providing motivational-stage based counselling • Developing skills for environmental reevaluation
	Knowledge	<ul style="list-style-type: none"> • Providing information via websites and emails about: <ul style="list-style-type: none"> ○ General physical activity guidelines or antenatal and postnatal adjusted guidelines ○ Cardio-vascular diseases and type 2 diabetes ○ Tips for physical activity behaviour modification ○ Benefits of physical activity during pregnancy ○ Correcting misconceptions about physical activity ○ Health and social benefits of physical activity ○ The FITT principles, ○ How to develop a personalised exercise program ○ Stretching tips and types of activities that can be done at home or in a gym • Providing a pregnancy adjusted exercise instruction video

	Self-efficacy	<ul style="list-style-type: none"> • Brainstorming realistic expectations
	Self-regulatory efficacy	<ul style="list-style-type: none"> • Developing skills for self-monitoring and daily PA record holding • Providing pedometers • Developing skills to schedule PA • Developing skills to develop a tailored PA program • Developing goal setting skills
	Barrier self-efficacy	<ul style="list-style-type: none"> • Developing skills to overcome PA barriers • Identifying supportive others and needed types of support • Challenging existing social structures that encumber PA • Increasing PA commitment
	Body image and self-esteem	<ul style="list-style-type: none"> • Organising group discussions on dealing with possible perceptions of being an object that is evaluated on the basis of appearance
	<i>self-worth</i>	<ul style="list-style-type: none"> • Organising a book club on self-worth related topics • Challenging internalised negative self-evaluations
Social environmental	Social networks	<ul style="list-style-type: none"> • Developing supportive networks and a collective identity • Focusing on the centrality and continuity of relationships throughout women's lives • Organising community walks • Making women aware of free walking groups • Organising exercise classes • Organising group discussions on PA related issues and generating positive PA beliefs
	Emotional support: encouragement	<ul style="list-style-type: none"> • Telephone counselling • Identifying supportive others • Regular SMS to encourage the nominated support person of their duty to provide PA support • Organising community walking events • Focusing on the centrality and continuity of relationships throughout women's lives • Generating positive PA beliefs through group discussions
	Companionship	<ul style="list-style-type: none"> • Organising community walking events • Making women aware of free walking groups • Organising exercise classes
	Informational support	<i>See strategies to increase knowledge</i>
	Instrumental support	<ul style="list-style-type: none"> • Providing exercise DVDs
	Social cohesion and social capital	<ul style="list-style-type: none"> • Improving local government involvement in the formative stages of the project

PA= physical activity, p= pregnancy, m= mothers, n= nulliparous women, w= women, 4= postnatal, ?= unclear

The interventions discussed in this chapter were effective in bringing about change in physical activity among nulliparous women, pregnant women and/or mothers. These intervention strategies may be useful to include in future physical activity interventions.

Interesting to note is that none of the discussed interventions addressed the physical environment. Although the literature review in Chapter 4 suggested that the physical environment may be of less significance compared to individual factors and social environmental factors during pregnancy and the postnatal phase, it still offers facilitating factors that have been shown to benefit women's physical activity behaviour during this phase in their lives (see Chapter 4, section 4.3). This was also confirmed by a recent intervention study among African-American and Latina women³⁵⁰ (excluded from review as the intervention did not find a significant increase in physical activity). It was concluded that although the mere presence of a supportive neighbourhood may not be sufficient to increase physical activity on its own, interventions focusing on individual and social factors can be more effective in increasing physical activity among women if a supportive neighbourhood is present. It is therefore important to consider the physical environmental context when planning interventions and programming to increase physical activity among nulliparous, pregnant and postnatal women.

This review also identified a potential lack of published intervention studies among pregnant women and mothers in Australia. Previously discussed physical activity interventions that focused on pregnant or postnatal women were conducted in the United States, Hawaii, Canada, Finland and Iran.^{283, 330, 334, 336, 344, 345} This review did not locate any published, peer-reviewed physical activity interventions among pregnant or postpartum women in Australia. More physical activity intervention research among pregnant and postnatal women is therefore needed. In relation to determinants, it remains unclear whether the addressed determinants within this review (apart from behavioural beliefs, knowledge and informational support) are significant in relation to predicting physical activity behaviour among pregnant and postnatal women (see Table 5.1). Therefore, further research is needed on the ways in which to tailor physical activity interventions to the specific needs of Australian antenatal and postnatal women.

Chapter 6. Findings and Discussion Longitudinal Study: Life and Physical Activity Changes

6.0 Introduction

This chapter describes the demographic characteristics of the study longitudinal sample and explores the life and physical activity changes as experienced by this sample of Sunshine Coast women throughout pregnancy until three months postpartum. This chapter provides an answer to the first research question: What part does physical activity play in women's lives and how do their lives and physical activity behaviours change throughout pregnancy and the first three postnatal months? These changes were explored to define the contextual reality in which women's physical activity experiences and meanings are formed in order to inform implications for intervention design. This chapter therefore also contributes to answering the fourth research question: What are the implications for future intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and the first three postnatal months? A comprehensive answer to the fourth research question is provided in Chapter 9.

Longitudinal Study Sample Attributes

The characteristics of the participants (n=30) show that a diverse sample was obtained (see Table 6.1). The majority of the sample was between 21 and 35 years, two were teenage mothers and three women were over 35 years. Three women were single mothers and twenty-seven women were either married or in a de-facto relationship. Nearly half of all participants had not continued any education past secondary school and most remaining women had a certificate or diploma. Women were in various stages of motherhood with approximately just as many primigravidas as multigravidas. Multigravidas had either one or two young children. Approximately half of all participants were working of which one participant was a multigravida. Most participants were born in Australia, two were born in England, one in New Zealand, and one participant was born in Japan. The demographic characteristics of the sample were compared with available Sunshine Coast prenatal data^{212, 213} in order to speculate in relation to generalisation. No significant differences were found between the sample and Sunshine Coast antenatal

demographics. This sample may therefore be representative for the Sunshine Coast. However, no comparable Sunshine Coast prenatal data was found in regard to education, pregnancy status and working status.

Table 6.1 *Demographics of participants in comparison to Sunshine Coast prenatal data*

		<i>N Total</i>	<i>N %</i>	χ^2	p
Total n		30	100		
Age	< 21 years	2	6.7	0.748	NS
	21-25 years	8	26.7		
	26-30 years	9	30		
	30-35 years	7	23.3		
	36-40	3	10		
	> 40 years	1	3.3		
Marital Status	Married	14	46.7	0.200	NS
	de facto	13	43.3		
	Single	1	3.3		
	divorced	2	6.7		
Income	< \$20,000	1	3.3	4.206	NS
	20,000-30,000	5	16.7		
	\$30,001-50,000	6	20		
	\$50,001-100,000	16	53.3		
	> \$100,000	1	3.3		
	Did not want to mention	1	3.3		
Highest Completed Education	year 10	3	10	-	-
	Year 12	8	26.7		
	diploma or certificate	14	46.7		
	bachelor degree or higher	5	16.7		
Pregnancy Status	Primigravida	17	56.7	-	-
	Multigravida	13	43.3		
Working Status	Working	14	46.7	-	-
	Not working	15	50		
	Full time student	1	3.3		
Nationality	Australian	26	86.7	-	-
	New Zealander	1	3.3		
	English	2	6.7		
	Japanese	1	3.3		

NS=Non-significant

6.1 Life changes

This section qualitatively describes the life changes that women experienced during each trimester of pregnancy (i.e. first trimester, second trimester and third trimester) and the postnatal phase. Figure 6.1 provides a general visualisation and explanation of how life changed over these time periods. Quotes from participants are used to illustrate some of these changes.

6.1.1 First Trimester

In the first trimester women reported trying to adjust their lives to pregnancy. Within the changes reported by these women, 7 key changes were identified: 1) adapting to physical discomfort and tiredness, 2) coping with fluctuating emotional states, 3) becoming more cautious in daily life to prevent self-harm, 4) nutritional adjustments, 5) making future plans and arrangements, 6) improving self-care, and 7) some participants had to deal with an unexpected pregnancy.

At the onset of pregnancy, discomforts such as feeling sick, tired, vomiting frequently and experiencing mood swings due to hormonal changes, were frequently mentioned. Women adapted their lives to these physical discomforts by reducing their physical activity habits, social interactions with friends and family, and their housework activities.

Although most described finding out about their pregnancy as a joyful and exciting moment in their life, for participants who did not plan a pregnancy it was described as a stressful moment that caused a lot of emotional turmoil. Women who were not in a relationship or who were left by their partner, were shocked when they found out they were pregnant. One woman reported she suffered from anxiety and depression, because of being unable to cope with the consequences of her pregnancy:

"Yeah, it's a pretty hectic story. I was in bible college and you're not allowed to have sex without being married and my partner's parents were the ministers of the church, so it was really a big shock for all of us and I had to leave bible college and I was a real nervous wreck, because I didn't want another child.....and I've been suffering from really bad depression, anxiety and I was emotionally unstable, because of the hormones as well." (Sheri, 21-25 years, second baby, not working, insufficiently active)

Another woman – who had a child from a previous marriage and mentioned the pregnancy being unplanned and that she and her partner were not living together yet – mentioned the pregnancy had negatively changed their relationship:

“My relationship with my partner changed....it’s just all a bit different, you’re not going out and have fun anymore and that sort of stuff...it’s been more quiet...”(Naomi, 31-35 years, second baby, not working, sufficiently active)

6.1.2 Second Trimester

In the beginning of the second trimester, most participants no longer experienced morning sickness and commonly experienced an increase in their energy levels. Participants felt less restricted and were more capable to carry out daily domestic and work-related chores. Due to feeling less tired and nauseated, participants also engaged in more social and outdoor activities.

Participants also commonly felt more relaxed and less cautious during their second trimester, due to the decreased risk of a miscarriage. However, towards the end of the second trimester (at \pm 25 weeks), participants commonly started to feel more tired again and physically restricted. Experiencing physical discomfort, restrictions and tiredness resulted again in more caution during daily activities.

Participants who were working during the second trimester commonly reported work-related changes. Women, who could afford it, had stopped working or mentioned having reduced their workload. Other women reported they worked more due to feeling better and because of the reduced risk of a miscarriage during the second trimester. However, women who continued their pre-pregnancy working hours reported they were often questioned whether they were doing too much or received special treatment at work. This special treatment and constant questioning was commonly perceived as frustrating:

“...they care because they don’t want me to overdo it, but it annoys me sometimes: can you just let me do my job?” (Judith, 21-25 years, first baby, working, sufficiently active)

6.1.3 Third Trimester

During the final trimester of pregnancy, participants' lives were commonly reported to be all about preparing for the birth of a new baby. Within the changes reported by these women, 5 themes were identified: 1) moving house, 2) 'nesting behaviour', 3) work related changes, 4) slowing down, and 5) becoming more dependant of the help of others. Women who experienced 'nesting urges' reported to have more energy, which was spent on getting the house ready for the new baby (i.e., housework activities and getting the baby room ready).

"I reckon I've got more energy. I know that sounds a bit funny but I don't know, like I don't know whether it's like the whole nesting mode thing kicking in or whatever else but yeah it's like I've got to do something....I've already got up, done two loads of washing and been grocery shopping this morning (Julie, 21-25 years, first baby, not working, sufficiently active)

Work-related changes were also commonly reported. Most women had reduced their working hours or had stopped working after 32-33 weeks. Slowing down was a recurring theme throughout the interviews. Many women reported having to slow down due to reduced energy levels, dizziness, physical discomforts related to the size of their abdomen and their baby's weight that was putting pressure on organs, which was uncomfortable and/or painful. Primigravida participants also mentioned to slow down, because they became more aware of the baby's presence. After these participants went on maternity leave, slowing down commonly meant becoming more cautious during daily activities, sleeping more during the day, and receiving more help with daily chores. Experiencing physical limitations also resulted in becoming more dependent of the help of others, which was commonly experienced as frustrating. Especially primigravida participants expressed feeling frustrated with becoming more dependent of the help of others. Coming from a working life, living quite independently and able to do everything by themselves, it was hard for these women to accept help. Needing help was also perceived as frustrating, because it meant everything took more time to complete.

"Well it's very frustrating because there's things I want to do, there's places I need to go, like today my Mum has to come and get me because I have a doctor's appointment this afternoon, and I'm not supposed to be driving, and it's very frustrating like I can't even go and do the grocery shopping, I have to wait for the weekend until my husband is off so we can go together, it is very frustrating" (Jessica, 36-40 years, first baby, insufficiently active)

6.1.4 Postnatal Period

After childbirth, participants' lives adjusted to suit the newborn baby. Naturally, primiparous mothers experienced more significant changes. New mothers commonly expressed joy; they enjoyed the new baby and being a mother. At the same time, these life changes also presented new struggles. Seven themes were identified in regard to these life changes: 1) it's all about the baby, 2) difficult to 'get out of' the house, 3) no time for myself, 4) fear of being an incompetent mother, 5) missing adult or intellectual stimulation, 6) afraid to let go of career, 7) the need to participate in more social activities.

The themes "missing adult or intellectual stimulation", "afraid to let go of career", "it's all about the baby", and "fear for being an incompetent mother" were only expressed by primiparous mothers. Going from daily social interaction at a work setting to being at home with their baby most of the day, was reported as something that was difficult to adjust to. The change from a working, independent woman to a stay-at-home mother was described by some as traumatic. These women did not expect their lives to change so drastically or that life would change permanently. A comment illustrating this included:

"I think I've only had one meltdown I think, that was about week 10...it was the realisation that my life was not going to be what it was. I love being a mother, but coming from having a focused career, it was not going to be that anymore." (Celeste, 31-35 years, first baby, not working, sufficiently active)

Some were afraid of letting go of their career, because they had worked hard to get where they were, and were afraid that by the time that their children would go to school, they would not be able to get a similar position. It must be noted that these women expressed that becoming a mother is worth the possible loss of their career, but struggled with the full acceptance of this as it made women feel they had worked hard for nothing. Primiparous mothers also mentioned struggling with the change from being free to do whatever they wanted in their spare time, to their life being dictated by their baby.

"[My life] It's not mine anymore, it's hers. Everything has changed. It just revolves around her now, basically. Like I said, I can't just get in the car and go to the shops or go to the gym or whatever. I have to lug a pile of shit around with me, and it's not just like a two second thing...you have to consider how she'll be doing whatever you're wanting to do and what stuff you've got to take with you, and how long you can be out for before she'll need a feed, or just stuff like that." (Jaimee, 26-30 years, first baby, not working, sufficiently active)

Although less or lack of "me time" was also commonly expressed by multiparous mothers, their life did not seem to be affected as much by the birth of a new baby.

The notion around “it’s all about the baby” also reflected on postnatal care services. Women expressed feeling lost in terms of how to deal with the radical changes that came with motherhood and reported they would have liked more guidance after being discharged from the hospital. One participant, who was originally from New Zealand, mentioned she wished the Sunshine Coast had a “Plunket” service, which is the largest provider of support services in New Zealand for the development, health and wellbeing of children under 5 years of age.³⁵¹ In terms of received information, women often stated they received information in relation to the baby (e.g., breastfeeding, looking after a baby, things to consider when putting a baby to bed), but did not commonly report having received information about self-care, such as physical activity.

“it wouldn’t hurt [to get more information on self-care] like you do get a lot of information when you leave the hospital, but it’s all related to the baby, looking right now at the coffee table there’s a publication from the Queensland government that comes with the pack that you get at the hospital called Move Baby Move, a bit more about what movements your baby should be doing, as opposed to things for the mother, so it would probably be very useful if that pack also contained exercises you can do at home to get your body back, and advice on exercise like what you can and what you can’t do and when and all that sort of thing.” (Molly, 41+, first baby, working, insufficiently active)

This need for more postnatal contact with health professionals, commonly expressed by primiparous mothers, was also closely linked to their fear of being an incompetent mother:

“...it’s just so overwhelming, and you have thoughts of am I doing everything right? Am I an all right mum? Those concerns you have. I think every mum would probably feel that way, especially if it’s your first time around, you don’t know what the hell you’re doing.”(Karen, 26-30 years, first baby, not working, insufficiently active)

Difficulty with “getting out of the house” was another common theme among participants. Participants, especially primiparous mothers, reported finding it very stressful to leave the house, because so many things needed to be done before one could leave. These things included: getting the baby ready to go out, feeding the baby, making sure the baby was well rested if not comfortable with sleeping in a pram, and making sure all the necessary things for the baby were not left behind. Although participants were struggling to leave the house, most women reported they eventually found a daily routine with their baby that allowed them to go out.

After the initial weeks, women reported to engage in more social activities compared to the third trimester of their pregnancy. These women reported to meet more frequently with friends who were also stay-at-home mothers, with mothers from their mothers' group or spent more time with their family. Participants who did not have friends with children, or had not joined a mothers' group yet, expressed that they felt a need to make new friends with women in a similar situation, because their friends would be at work during the day. Sitting home all day by themselves with nothing to do apart from housework and looking after their baby was dreaded by participants, especially by primiparous mothers.

"...housework is a turn off, but it's obviously there so we're still doing that and have to do it. Yeah I suppose I seek more stimulation of getting out of the house, like so I go to a mothers' group and then I catch up with friends and do that sort of thing, because it drives me nuts at home." (Lisa, 31-35 years, first baby, not working, sufficiently active)

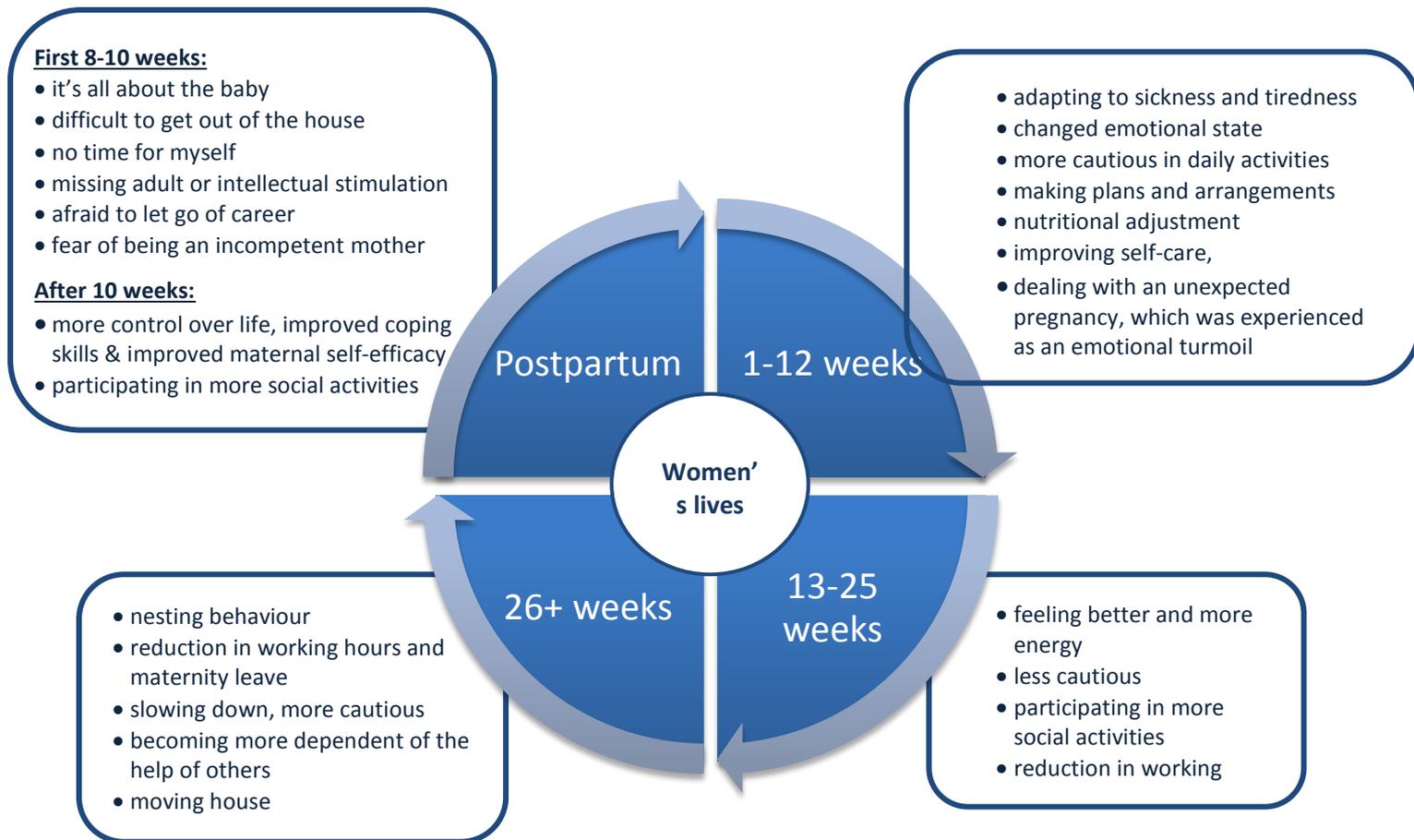
6.1.5 Discussion: Life changes

Figure 6.1 provides an overview of the changes that could be translated into opportunities for and barriers to physical activity. This model was used to inform the suggestions for future intervention research (see Chapter 9, sections 9.2 and 9.3).

Pregnancy was both a biological and a socio-cultural experience that varied based on personal circumstances. However, as pregnancy progressed, the biological or physical experience became more dominant. As pregnancy progressed, life changes were more often reported in terms of the growing body; physical changes and related discomfort were reported to have influenced their daily activities. Physical experiences of pregnancy in relation to physical activity have been described in previous studies (see Chapter 4, section 4.1.6). Physical changes occurring during pregnancy have also been described in more detail in the physiology literature.^{46, 352, 353} Such changes have formed the foundation for the current physical activity guidelines (see Chapter 1). Blackburn³⁵³ described the adaptations in major body systems in the pregnant woman including the clinical implications. These physical changes explain the common discomforts women in the longitudinal study experienced during pregnancy; changes in the respiratory system affects exercise, changes in gastrointestinal and hepatic systems can explain nausea and

vomiting, and changes in the neurologic, muscular and sensory systems can lead to musculoskeletal discomforts and headaches.³⁵³

Figure 6.1 *Reported life changes during pregnancy and postpartum: key themes*



After childbirth, life changes were more described in terms of how the added mother role and its consequences had impacted their personal life. Motherhood was perceived as a personal as well as a socio-cultural experience. The personal experience depended on various things such as coping skills, social support, and on the complications from labour. Labour-related physical discomfort was also reported; postpartum discomfort and pain commonly experienced included lacerations, episiotomy, perineal trauma, and incisions.³⁵³ Other postpartum discomfort and pain can be related to uterine contractions after delivery (afterpains), haemorrhoids, breast engorgement, and nipple tenderness.³⁵³

As was expected, life changes appeared to be more far-reaching in the first trimester and postpartum, especially among first-time pregnant women and mothers. For most first-time pregnant women, life changed a lot during the first trimester of pregnancy, including changes in their social life, eating habits and physical activity. Upon motherhood, life seemed to change even more drastically. New mothers in this study expressed a need for more postnatal contact and support from health professionals to ensure they were “doing the right thing” as a mother. Maternal self-efficacy – which can be defined as feelings of maternal competence, familiarity with the maternal role, and problem-solving skills²⁰ – appeared to be low among first time mothers. Seel’s findings³⁵⁴ showed that upon discharge from the hospital a new mother often feels a lack of confidence in relation to the ability to fulfil all the demands of motherhood. Previous research also found that the baby’s birth is celebrated, but not the accomplishment of the woman.³⁵⁴ The mother, including her personal life, skills, and experiences, can be relatively overlooked.^{354, 355}

New mothers in this study commonly mentioned struggling with this sudden and radical change of life. This was voiced very clearly (see section 6.1.4). In the postnatal period women felt unable to function normally and felt a certain loss of control and identity. It is therefore suggested that first-time mothers may experience varying levels of psychological decompensation in the first three postnatal months. Episodes of psychological decompensation can be defined as “exacerbations or temporary increases in symptoms or signs accompanied by a loss of adaptive functioning as manifested by difficulties in performing activities of daily living, maintaining social relationships, or maintaining concentration, persistence, or pace”.¹³ Research has shown that life changes such as becoming a mother for the first time can cause a lot of stress.³⁵⁶ Although increased arousal may initially improve coping, excessive arousal can lead to psychological decompensation.³⁵⁶ One study found that problems related to infant crying in the postpartum period were associated with psychological decompensation, especially among first-time mothers.³⁵⁷ Although research around psychological decompensation in the postnatal period is limited, it must be noted that this state appears to be temporary.³⁵⁷ In this study, postpartum participants commonly reported that after 8-10 weeks they had found a routine with their baby, had regained a certain sense of control over their life, and felt more confident in their ability to cope with the multiple demands of motherhood.

However, support during the early postpartum period is needed, especially among first-time mothers, if an improved wellbeing among new mothers is to be achieved.³⁵⁷

Smith³⁵⁸ also investigated pregnancy and the transition to motherhood. Although the focus was on women's changing identity, rather than life changes, it revealed similar findings compared to this longitudinal study: the first trimester as a period of adjustment and uncertainty, and the second trimester as a period where work was commonly reduced in order to move towards the more personal world of family.

Unlike Masser, Grass and Nestic,³⁵⁹ and Gatrell,³⁶⁰ this study did not find that participants' workplaces had negative attitudes towards them having a baby, including its implications such as maternity leave. However, the findings of this study were consistent with Neiterman's³⁶¹ findings as some women mentioned experiencing overprotective behaviour from their employer and/or colleagues.

Smith's³⁵⁸ findings indicated the third trimester to be an ambivalent time with some women questioning their identity after they had given up their work. In this study, women did not express such feelings until after childbirth. In addition, the findings in this study were not in line with Smith's³⁵⁸ findings indicating the transition from third trimester to new motherhood being a smooth process that lead to women choosing a more holistic lifestyle. The findings in this study suggest this transition to be much more complex. Although women in this study described new motherhood as a joyful, it was also characterised by high levels of stress. This topic is further discussed in Chapter 8, section 8.1.4.

Previous studies have investigated the physical experience of pregnancy, including social constructions of the pregnant body,^{362, 363} and the social experience of motherhood.^{149, 150, 364-368} However, Smith's³⁵⁸ research was the only study located within the reviewed literature that described life changes throughout pregnancy and during the transition to (new) motherhood. The longitudinal study therefore adds to the understanding of women's lives during pregnancy and postpartum.

6.2 Changes in Physical Activity Participation

This section describes what part physical activity plays in women's lives and the reported changes in physical activity participation that occurred during every pregnancy trimester (i.e., first trimester, second trimester and third trimester) and the postnatal phase. In order to facilitate the understanding of the process of these physical activity changes during pregnancy and postpartum, Figure 6.2 was developed to conceptualise the major themes relating to participants' physical activity changes over this period of time. Quotes from participants were used to illustrate some of these changes.

6.2.1 First Trimester

Pre-pregnancy, leisure-time physical activity was often mentioned in addition to incidental activities like going to the shops, housework, activities at work, and looking after their children. Walking was the most frequently mentioned activity. Other reported pre-pregnancy physical activities included going to the gym (classes, weights and/or cardio), Zumba, surfing, horse riding, swimming, team sports (volleyball, Oz tag), running and jogging. The Australian bureau of statistics found that among Australian and Queensland women the top 3 activities consisted of 1) walking, 2) aerobics/fitness/gym, and 3) swimming.³⁶⁹ These findings are similar to the findings within this study.

During the first trimester, participants reported a decrease in their physical activity habits in relation to intensity and frequency. Physical activity was approached in a very cautious and protective manner.

"Yeah, I was just cautious with lifting things, so that I wasn't putting stress on the baby and that's probably about it, just making sure I wasn't lifting heavy things or just stressing myself out." (Janine, 26-30 years, first baby, working, insufficiently active)

Time spent on incidental activities such as housework, cooking and shopping decreased and leisure-time activities were either decreased or discontinued. In addition, many pre-pregnancy activities were discontinued such as Zumba, horse riding, surfing, jogging and team sports. Some participants changed the type of activity. These women started new activities to make up for the ones that were reduced or discontinued. One participant mentioned she joined a yoga class to replace some of the walks and swims. Some participants continued their physical activity habits upon pregnancy, but among these

women pre-pregnancy physical activity levels were already low. Only a few women increased their physical activity behaviour. Of the 30 women interviewed, 40% mentioned they met the physical activity recommendation of 30 minutes of moderate intensity physical activity on at least 5 days per week. Some of the participants who did not meet the physical activity recommendation during the first trimester also reported an inactive lifestyle before pregnancy.

6.2.2 Second Trimester

An increase in physical activity behaviour during the second trimester was frequently mentioned:

"I'm more active now...I wasn't really comfortable not being as active as what I wanted to be in the first trimester, but was not really able to do anything about it, I just felt too sick and tired...I'm now able to change that, so that's been good." (Joy, 26-30 years, first baby, working, insufficiently active)

Women who increased their physical activity habits commonly participated in activities such as swimming, walking, incidental activities (walking to shops and housework), yoga, pilates, and cycling. Although participants had commonly increased their physical activity during the second trimester, many still did not meet the physical activity recommendation.

Participants, who decreased their physical activity habits during the second trimester, mentioned decreasing the frequency of activities or decreasing the duration of activities. Discontinuing activities, taking more rest during the exercise, and only engaging in incidental physical activity was also mentioned during the second trimester. Of the women who decreased their physical activity behaviour during the second trimester, some were still meeting the physical activity recommendation.

Of the 12 women who were meeting the physical activity recommendation in the first trimester, seven participants continued meeting the physical activity recommendation during the second trimester. Of the remaining four women, two dropped out before the second interview and three women reduced their physical activity habits for reasons discussed in Chapters 7 and 8. Two women were not meeting the recommendation during the first trimester, however did meet this recommendation during the second trimester.

Others (n=16) continued to engage in insufficient physical activity. Both women who were insufficiently active and women who were meeting the physical activity recommendation reported engaging in incidental activities (e.g., job-related activities, housework, shopping, walking to drop off or pick up children from school). However, women who were meeting the recommendation tended to be more likely to engage in exercise in addition to incidental activities compared to women who were not meeting the recommended amount of physical activity.

6.2.3 Third Trimester

Physical activity behaviour was commonly reduced during the third trimester compared to the second trimester of pregnancy. This phase was about compromising due to physical restrictions.

“It is physically uncomfortable to do certain things now and like if I bend the wrong way it actually pulls and hurts and I feel like I squish him.”(Judith, 21-25 years, first baby, not working, insufficiently active)

Women who reported having reduced their physical activity habits commonly engaged in 10-20 minute, low intensity walks, 1-3 times per week. Others reported having reduced only the intensity or the frequency of their walks. Leisure-related physical activity seemed to be more reduced than incidental or housework-related physical activity. Discontinuing exercise and reducing housework was also reported. Among the remaining 23 participants within this study (7 women had dropped out), 17 women reported not having met the physical activity recommendation.

Participants, who increased their physical activity behaviour, reported increasing duration or frequency of walks, increasing housework activities, and/or increasing frequency of gym visits. Participants who increased their physical activity habits or continued previous physical activity habits, commonly reported to have met the physical activity recommendation. Of the 9 participants who were meeting the physical activity recommendation during the second trimester, only 3 participants continued to meet this recommendation during the third trimester. These three participants had been meeting the physical activity recommendation throughout pregnancy.

Change in type of exercise was also commonly reported. These women reported having increased incidental physical activity related to moving house and housework, but decreased the frequency and duration of their leisure walks. Exchanging swimming for walking due to a decrease in temperature was also mentioned. However, some women mentioned nothing had changed.

6.2.4 Postnatal Period

The moment when participants started to engage in leisure physical activity after childbirth varied from one week to three months postpartum. This phase was all about adjusting to the new born baby. Participants' physical activity levels in terms of frequency varied from once or twice a week to five times per week. Although this was an increase in physical activity for some participants, others mentioned having continued or decreased their physical activity habits compared to the third trimester. Women had commonly decreased their physical activity levels during the first 2-8 weeks and had slowly increased their physical activity levels after.

Walking was commonly reported as an activity that was picked up again after childbirth, with the duration and frequency of the walks gradually increasing. Other activities mentioned by participants in the first 3 months postpartum included swimming, pelvic floor exercises, aerobics, jogging, gym based cardio and resistance training, boxing cardio classes, yoga, Zumba and belly dancing. Although leisure activities were commonly reported, some participants struggled to do more than incidental activities at 3 months postpartum.

"...every week I think right this week I'll be organised enough to get back and do some exercise, and then everything goes – it didn't pan out the way it was planned, but I'm at the point now where I must start exercising, but I haven't yet not in as much as going for a walk or something" (Molly, 41+ years, first baby, working, insufficiently active)

Compared to pre-pregnancy, participants also reported having changed the type of physical activity to suit the baby (e.g., pram walking, walking with baby in carrier) and perceived carrying a baby around as exercise as well. Only one participant met the physical activity recommendation throughout pregnancy and postpartum despite sickness, tiredness and having almost no partner support as her partner was working in

Western Australia most of the time. She commented during pregnancy:

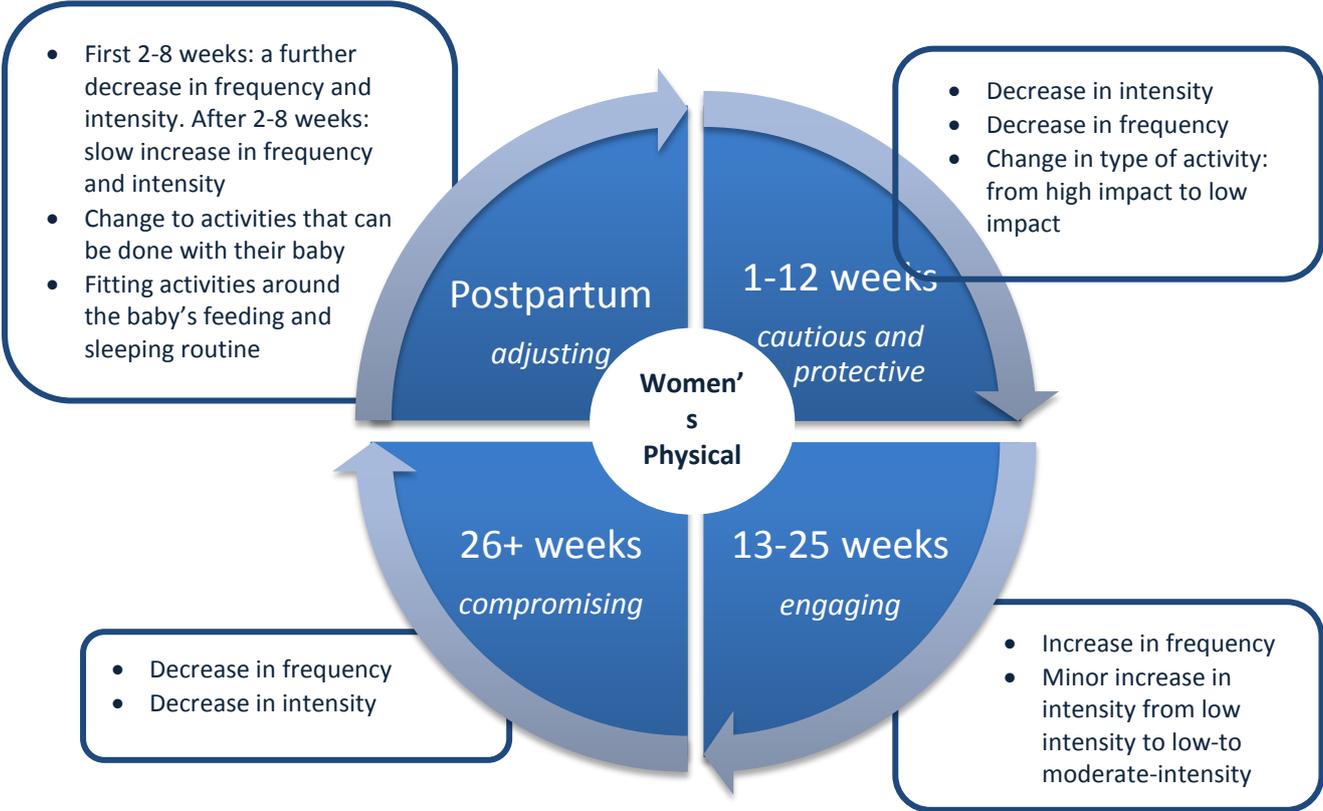
[I remain active], because I wanna stay strong and I don't want to put on excess weight during pregnancy and they reckon it has heaps of benefits for the baby and heaps of benefits for giving birth, like actual labour and stuff and I sort of think that if I keep the strength and my muscles and stuff, it'll be a lot easier to get back to my normal size after birth as well. Basically, just feeling good about myself and just feeling good physically, because for me it really helps with the way I feel as a whole sort of thing.....[physical activity] will be the last thing on your mind if you weren't active before, especially in the first trimester." (Jaimee, 26-30 years, first baby, working, sufficiently active)

6.2.5 Discussion: Physical Activity Changes

Figure 6.2 provides an overview of women's physical activity behaviour during pregnancy and postpartum. This figure was inspired by a study conducted by Cioffi et al.¹⁰⁴ Although some women deviated from this generalisation as described within this chapter, this illustrates how physical activity habits changed over time for most women. Women's physical activity habits during pregnancy and postpartum depended on a variety of factors. These factors are discussed in Chapters 7 and 8.

The general physical activity trend shown within this study agrees with the previous findings (see Chapter 1, section 1.4) that women decreased the duration, frequency, and/or intensity of physical activity once they became pregnant.^{47-49, 86} In this study women meeting the physical activity recommendation were similar during the first and second trimester and postpartum, but lower during the third trimester, which was not investigated in previous research. In regard to low intensity physical activity however, women appeared to be more active during the second trimester compared to the first and third trimester, which was also confirmed by previous research.⁸⁹ The findings of this longitudinal study agree with the finding that physical activity, especially leisure-time physical activity, further declined after childbirth compared to the third trimester,⁸⁶⁻⁸⁸ but adds that this is only true for the first 2-8 weeks. After this period, women seemed to slowly increase their physical activity levels. However, it must be noted that women only reported on their physical activity behaviour during the first three postnatal months.

Figure 6.2 Women's physical activity behaviour during pregnancy and postpartum



In regard to domestic activity, participants mentioned to have decreased their domestic activities during the first trimester. These findings therefore do not agree with the findings of a previous study indicating that domestic activity remained unchanged over the course of pregnancy.⁹⁰ The study findings also show that if women were relatively inactive pre-pregnancy, it was commonly too hard for them to start during pregnancy due to the addition of sickness, tiredness and physical discomfort.

Various research has looked at ways in which pregnant women construct their health and health practices.³⁷⁰⁻³⁷³ Consistent with these findings, this study showed that life transitions such as pregnancy and becoming a mother were conceptualised as times of change in relation to personal health attitudes and practices such as physical activity. The specific life changes that relate to this adjustment in physical activity have been discussed in section 6.1. Other factors associated with this change are explored and described in the following chapters.

6.3 Chapter Conclusion

Chapter 6 provided an overview of life and physical activity changes which can be viewed as pregnancy and postnatal specific contextual realities. Figures 6.1 and 6.2 provided overviews of the complexities in relation to life and physical activity changes, which can be translated into opportunities for physical activity during pregnancy and postpartum. Chapter 9, section 9.2, discusses how these complexities were utilised in setting out the implications for intervention design.

Chapter 7. Findings and Discussion Longitudinal Study: The Socio-Ecological Analysis

7.0 Introduction

As shown in Chapter 4, no longitudinal study has previously been conducted that investigated the determinants of physical activity throughout pregnancy and the postnatal period. In relation to cross-sectional studies, there has also been very limited research conducted in Australia, especially in Queensland, with no previous research conducted on the Sunshine Coast in regard to the determinants of physical activity during pregnancy and postpartum. It was concluded that since many determinants were sensitive to social and cultural norms, determinants should be investigated on a small geographical scale.

This chapter describes and discusses the results from the socio-ecological analysis of physical activity determinants as experienced by a sample of Sunshine Coast women throughout pregnancy until three months postpartum. This chapter contributes to the second research question: How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy and the first three postnatal months?, and also contributes to the fourth research question: What are the implications for future intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and the first three postnatal months? A comprehensive answer to the second and fourth research question is provided in Chapter 9.

Table 7.1 represents the results of the organisation and categorisation of physical activity determinants using the socio-ecological framework, including individual, social environmental and physical environmental determinants. The following sections discuss these determinants, following the same structure as Chapter 4 in order to highlight which findings: 1) confirm and extend the existing literature to the Sunshine Coast and to specific trimesters during pregnancy and the first three postnatal months; 2) question

previous findings, and 3) which findings are novel. Quotes from participant interviews were used to illustrate identified determinants.

Table 7.1 *Summary: Determinants of physical activity across the pregnancy and postnatal period*

	1 st trimester	2 nd trimester	3 rd trimester	Postnatal
Individual determinants				
Overall attitude	-	-	-	-
Positive and negative behavioural beliefs	X	X	X	X
Intention	-	?	-	-
Motivation	X	X	X	X
Knowledge	X	X	X	X
Self-efficacy	X	X	X	X
Sickness	X	-	-	-
Physical discomfort and tiredness	X	X	X	X
Priority	X	X	X	X
Body image and self-esteem	-	-	-	-
Social environmental determinants				
Social networks and social interaction	X	X	X	X
Emotional support from partner, friends and family	X	X	X	X
Support at work		X	X	
Instrumental support	X	X	X	X
PA companionship	X	X	X	X
Informational support	X	X	X	X
Social inequality: <i>Race, education, income</i>	-	-	-	-
<i>Costs of PA and childcare facilities</i>	X	X	X	X
<i>Time constraints</i>	X	X	X	X
Social cohesion and social capital	NE	NE	NE	X
Neighbourhood safety: perception of crime	X	X	X	X
Physical environmental determinants				
Aesthetics	X	X	X	X
walkability and cyclability	X	X	X	X
<i>Proximity to facilities such as shops, cafés and library</i>	X	X	X	X
Availability of and proximity to PA facilities	X	X	X	X

Home PA equipment	-	-	-	-
Transport	-	-	-	-
Neighbourhood safety	X	X	X	X
Weather conditions	X	X	X	X

PA= Physical activity, NE= Not explored, ?= unclear, X= Significant, - = Non-significant

7.1 Individual Determinants

Individual struggles were commonly mentioned during pregnancy and the postpartum period. Table 7.2 provides an overview of the individual determinants and highlights whether they: 1) confirm and extend the existing literature to the Sunshine Coast, and to specific trimesters during pregnancy and the first three postnatal months; 2) question the existing literature, and/or 3) are novel and therefore add to the existing literature.

Table 7.2 *Longitudinal study findings compared to the literature review: Individual determinants*

Determinants	Women and mothers	Pregnant women	Longitudinal study
Attitude			
<i>Positive & negative behavioural beliefs</i>	87, 93, 112, 238, 244-257	87, 104, 105, 248, 252, 260-273	Confirms and extends existing literature indicating the importance of certain specific behaviour beliefs in relation to PA during pregnancy and postpartum
<i>Attitudes towards specific activities</i>		269	Adds to limited existing findings indicating walking, swimming and group exercises are the most enjoyed activities during pregnancy. Postpartum, walking is the most enjoyed activity, because women do not wish to leave their baby with someone else during this period
Intention	87, 243, 251, 275	87, 260-263	Questions its importance during pregnancy and postpartum
Motivation	225-227, 245, 248, 250, 254, 276-280	104, 105, 248, 265, 268-270, 283	Confirms and extends existing literature, indicating its importance throughout pregnancy and postpartum

<i>Internal motives:</i>			
<i>Enjoyment</i>	247, 252, 255, 275, 280	105, 252, 268	Confirms and extends existing literature indicating its importance throughout pregnancy and postpartum
<i>Social interaction</i>	245, 280, 284, 285	104, 264	Confirms and extends existing literature indicating its importance throughout pregnancy and postpartum. However adds that this only appears to be an important determinant in combination with PA companionship
<i>Achievement and personal satisfaction</i>	255, 280	269	Questions its importance during pregnancy and postpartum
<i>To improve mood, stress relief and to 'get out of' the house</i>	112, 225, 238, 246, 255, 280, 285-289	104, 105, 260, 265	Confirms and extends the existing literature indicating its importance throughout pregnancy and postpartum
<i>Part of their identity and routine</i>	238, 247, 253, 275, 290	105, 264, 265, 269	Confirms and extends the existing literature indicating its importance throughout pregnancy and postpartum
<i>The growing body</i>		269	Confirms and extends the existing literature indicating its importance during pregnancy
<i>Knowledge</i>	244, 253	264, 268, 270, 291, 292	Confirms and extends the existing literature, indicating its importance throughout pregnancy and postpartum, and adds by indicating the difference in knowledge-related needs during pregnancy compared to postpartum
<i>Self-efficacy</i>	87, 223-230, 250, 251, 275, 276, 293, 294	87, 260-263, 283, 295, 296	Adds qualitative data around self-efficacy as an important PA determinant during pregnancy and postpartum, and questions the previously reported decline of PA self-efficacy during pregnancy
<i>Sickness, tiredness and physical discomfort</i>	87, 93, 225, 227, 245-247, 252, 264, 276-279, 281, 284, 296, 297	87, 104, 105, 248, 252, 265, 268, 269, 283, 292, 297	Confirms and extends existing literature, indicating sickness as an important determinant during the first trimester, and tiredness and discomfort as important throughout pregnancy and postpartum

Priority		270	Confirms and extends existing literature, indicating its importance throughout pregnancy and postpartum, and adds that priority appears to be linked to physical discomfort and tiredness
<i>Prioritising one's children and family above oneself</i>	112, 247, 249, 252, 254, 256, 264, 279, 284, 290	252	Confirms and extends existing literature confirming this as an important determinant of PA behaviour
Body image & Self-esteem	112, 238, 247, 254, 255, 264, 278, 290, 299	291	Questions its importance during pregnancy and postpartum

PA= Physical activity, NE= Not Explored

7.1.1 Attitude: Positive and Negative Behavioural Beliefs

Participants commonly mentioned positive as well as negative behavioural beliefs related to physical activity during pregnancy and postpartum. Table 7.3 provides a summary of physical activity related behavioural beliefs as a determinant of physical activity behaviour during pregnancy and postpartum.

Table 7.3 *Positive and negative behavioural beliefs towards physical activity during pregnancy and postpartum*

Stage	Perceived Risks and Benefits
Throughout pregnancy and postpartum	<ul style="list-style-type: none"> • PA prevents excess weight gain, improves fitness, strength and posture, makes labour easier and expedites recovery from labour • PA improves overall mood, self-esteem, body image, reduces stress levels, prevents depression, generates positive states of mind and happiness • Uncertainty about the effect of PA on the foetus' health • An active lifestyle is important to be able to keep up with your children and be a good role model • If too busy, PA is a chore rather than an enjoyable activity and loses its priority
1st trimester	<ul style="list-style-type: none"> • In the first trimester, women have to be really careful with exercise, because of an increased risk for miscarriages during this period
2nd trimester	<ul style="list-style-type: none"> • From the second trimester onwards, there is less chance of a miscarriage • Getting out of the house and being active is more enjoyable now feeling better

3rd trimester	<ul style="list-style-type: none"> • PA is now more of a chore • Physical discomfort reduces PA enjoyment • If experiencing physical discomfort, PA should be reduced as continuing could potentially harm you and your baby, and could also lead to premature birth
Postnatal	<ul style="list-style-type: none"> • PA assists with reclaiming pre-pregnancy weight and shape • You owe it to your baby to be active and look after yourself • You are able to be a better mother if you are active • Getting out of the house is important to stay sane and is good for the baby • Maintaining a sufficient level of PA is too hard with a newborn baby • Putting own needs such as PA before the baby's needs makes me feel selfish and guilty

PA= Physical activity

From these findings it can be concluded that there was a wide range of behavioural beliefs that somewhat changed over time, especially from pregnancy into motherhood. Although during pregnancy most women perceived physical activity as healthy for themselves, they were often not sure about its impact on the baby's health. Overall attitude did not seem to influence women's physical activity behaviour. Most women acknowledged the connection between body and mind, but this behavioural belief did not appear to be an important determinant on its own.

Insufficiently active women tended to hold one or more of the following beliefs: 1) Physical activity is a chore, 2) Moderate intensity exercise can cause a miscarriage or premature birth, 3) Fulfilling own needs instead of the needs of others is selfish during motherhood, 4) I do not have time to be active. Active women tended to hold one or both of the following beliefs: 1) I owe it to my baby and children to be active and look after myself, 2) Physical activity enables me to be a better mother, because I feel less stressed and revitalised after'. However, it must be mentioned that these positive beliefs in relation to physical activity were uncommon.

These findings confirm and extend the existing literature in that overall attitude does not appear to be associated with women's physical activity behaviour during pregnancy and postpartum, while certain specific beliefs do appear to be related.

7.1.1.1 Attitude towards Specific Activities during Pregnancy

Upon pregnancy, pre-pregnancy activities such as horse riding, surfing, jogging and team sports were discontinued, because these were perceived as potentially harmful. Activities that were continued and enjoyed during pregnancy included walking, swimming and going to the gym for individual workouts or group classes. One participant picked up yoga, because this was believed to be good during pregnancy. However, the gym and pool was avoided during the first trimester of pregnancy if sickness was experienced. Postpartum, walking was the main activity, because they did not want to put their baby into childcare during the first three postnatal months. These findings therefore add to limited research (see Chapter 4, section 4.1.1.2) in relation to what activities are enjoyed during pregnancy and postpartum.

7.1.2 Intention

In the first trimester, women who felt well during their first trimester continued previous activities if they considered these to be appropriate. Despite the fact that many women had the intention to be active, their physical activity behaviour was not predicted by intention. Women who experienced excessive tiredness and/or nausea reported not being able to be as active as they initially intended.

At the end of their first trimester, participants mentioned having the intention to increase their physical activity behaviour from the second trimester onwards. Participants commonly followed through this intention to increase their physical activity behaviour, but were not commonly able to meet the intended physical activity recommendation. Some of these women perceived their current physical activity habits as sufficient or felt like doing more would be pushing themselves too hard considering their demanding job:

“Well knowing that I’ve got to work for longer hours and knowing that I can’t do what I used to be able to do, but knowing I’ve got to take it a bit easier than that. I mean I felt like I can do it, but I can’t. The reality of it is you can’t” (Sally, 21-25 years, first pregnancy, working, insufficiently active)

At the end of the second trimester, participants’ intention to be active in the third trimester varied greatly. Participants had the intention to become more active, to continue current physical activity habits, or intended to slow down their current physical

activity habits due to physical limitations that started to arise at the end of their second trimester. Women were mostly not able to follow through their intention to become more active. Only a few were able to remain as active as they were previously.

At the end of their third trimester, intentions to increase physical activity habits after childbirth were commonly reported, but some participants did not have the intention to meet the physical activity recommendation after childbirth, because they did not expect themselves to be capable due to physical and/or time constraints. Primigravidas commonly expressed not to have any intentions as they did not know what to expect after childbirth in regard to how they would feel and how to combine physical activity with being a mother. Some women had the intention to become more active, but were unsure whether they would be able to once they would start working again:

“Well I would like to do more exercise, but it will depend on how I’m juggling everything because I’ll still have work to do as well. So my intention would be to do so, whether it’s going to be a reality or not remains to be seen” (Molly, 41+ years, first baby, single mother, working, insufficiently active)

Multiparous participants commonly had the intention to reduce their physical activity habits in the first 4-6 postnatal weeks, because they knew from previous experience how draining labour and looking after a newborn baby can be.

In summary, whether participants followed through on their intention during or after pregnancy largely depended on how tired they felt, how much physical discomfort was experienced and how motivated and confident they felt in continuing or increasing their physical activity behaviour. Although, intention may be an important determinant in the second trimester it did not appear to be an important determinant during the remaining stages. The findings in this study do not agree and therefore question the findings in the literature review that indicate intention to be an important determinant of women’s physical activity behaviour during pregnancy and postpartum. It is suggested that pregnancy and the postpartum phase are quite unpredictable periods in a woman’s life, with significant and constant physical, hormonal, psychological, emotional changes. Whether women were active or not seemed to depend more on their experience of these changes and whether they perceived physical activity as a priority, rather than their intentions towards physical activity.

7.1.3 Motivation

During the first trimester, a lack of motivation to be active due to sickness and tiredness was very common. Participants, who did not experience much sickness or tiredness, were more motivated and more likely to be active during the first trimester.

Participants' level of motivation to leave the house and be active had generally increased in the second trimester, now they felt better again. Only one woman reported she was also motivated, because it was part of her pre-pregnancy routine and part of her identity, which she did not want to let go of. Other women mentioned that their desire to prevent excess weight gain motivated them to be active.

Women who were not motivated to be active mentioned that although they felt better, the rain, heat, and physical discomforts demotivated them. Others perceived it to be too late to start increasing their physical activity habits, did not enjoy physical activity, and/or did not see the need to be active as no health problems or overweight issues were experienced. Some of these women also mentioned that because they were pregnant, they were not exercising anymore to lose weight or improve muscle definition, which was previously their main motive. Losing this motive decreased their level of motivation and therefore also decreased their physical activity levels.

Participants who were motivated to be active appeared to engage in more physical activity compared to women who were not motivated to be active. This finding became especially clear when participants were asked what type of support helped them the most to be active. A common response was:

"It doesn't really have anything to do with support because it's still completely my own motivation that makes me do it" (Jaimee, 26-30 years, first baby, working, sufficiently active)

In the third trimester, women's motivation to be active greatly depended on the intensity of experienced physical discomforts and tiredness. Postpartum, participants' motivation often varied from day to day, depending on feelings of soreness and weakness from labour, and/or lack of sleep. Some women mentioned *"I was too busy with the baby to even think about physical activity"*. Women who gradually increased their physical activity habits after the first few weeks mentioned that it was their weight and the way they

looked that motivated them to be active:

“Well I had no motivation in the first six weeks really, but after that I actually was getting motivated going I don’t want to be fat anymore, I want this gone, I want this belly gone and everything like that so that’s when I started walking quite a lot” (Judith, 21-25 years, first baby, not working, experienced intense physical discomfort, insufficiently active)

Within the group of participants who reported to be very motivated to be active after childbirth, 6 reasons were identified in relation to why they were motivated: *“It provides me with the opportunity to get out of the house and break up the day”, “I want to get back into shape”, “I want to be a good role model for my children”, “being active with other mothers gives me the opportunity to socialise”, “it settles the baby”, “I want to be healthy”, and “my kids motivate me to go outside and be active”.* Women, who expressed such motives were more likely to be active postpartum.

Motivation seemed to be an important determinant of women’s physical activity behaviour during pregnancy and postpartum. Findings in this study agree with the existing literature in relation to overall motivation and specific motives, mentioned in Table 7.2. However, findings also add that social interaction as a motive may only be an important enabler of physical activity during pregnancy and postpartum in combination with physical activity companionship (discussed in section 7.2.1.5). Motives related to achievement and personal satisfaction were not identified in any of the pregnancy trimesters or the postnatal phase. These motives are therefore questioned as determinants of antenatal and postnatal physical activity behaviour.

7.1.4 Knowledge

During pregnancy, women commonly reported not to be aware of how much physical activity was safe. Especially in the first and third trimesters, these safety concerns limited women’s physical activity behaviour. Participants often expressed quite conservative views such as *“Only gentle exercise is good”* and were quite concerned about harming their unborn child or causing a miscarriage, which made them cautious and reduce their physical activity behaviour in terms of intensity, duration and frequency:

“Yeah, I was afraid that if I would have continued jogging eight laps around the oval that I would be doing some harm to it and I might have lost it” (Celeste, 31-35 years,

first baby, working, insufficiently active)

Extra precaution was taken and participants' focus was more on how to prevent self-harm and harm to the baby rather than on finding out about optimal physical activity regimes during pregnancy. Previous research also found that the first trimester can be classified as a stage where there is a lot of uncertainty around 'the dos and don'ts' which goes together with protective behaviour, leading to a decrease in physical activity behaviour¹⁰⁴.

Participants commonly felt more relaxed and less cautious during the beginning of their second trimester due to the decreased risk of a miscarriage. However, towards the end of their second trimester, they also became more aware of the baby, which again resulted in more cautious behaviour during daily activities (e.g., decreasing the intensity and frequency of their activities, and more careful with lifting and bending).

In the third trimester, concerns grew stronger again (to similar levels as the first trimester), because of size, physical discomfort and tiredness. Participants also mentioned that not knowing whether current activities were safe and for how long these activities could be continued made them reduce their physical activity levels.

However, some participants did not have any physical activity related concerns and felt completely safe with what they were doing during their pregnancy as they decreased the volume and intensity of their activities to a level they were happy with. Some women mentioned not being concerned because they considered themselves not being active enough to worry about overdoing it. These participants mentioned that it was not the lack of knowledge, but other factors that explained their current physical activity or inactivity:

"No [more knowledge would not have made a difference], it was just feeling sick and tired" (Jessica, 36-40 years, first baby, active until 33 weeks when she took maternity leave from an active job)

After childbirth, it was uncommon for women to be concerned about physical activity. Women no longer had to fear potentially harming the baby and were commonly more concerned about not doing enough rather than too much. Physical activity safety concerns can therefore be seen as a determinant of physical activity during pregnancy only. However, knowledge about the benefits of physical activity in terms of improved coping

skills to deal with the multiple demands of motherhood did seem to be more common among mothers who were meeting the physical activity recommendation postpartum.

The literature review showed that there was very limited research conducted on knowledge as a determinant of physical activity behaviour during pregnancy and the postnatal period. In this study, participants had commonly no idea of the antenatal or postnatal physical activity guidelines and a limited understanding of the benefits of physical activity during this period. These findings therefore confirm and extend the existing literature indicating that knowledge is an important determinant of women's physical activity behaviour during pregnancy, and add that knowledge is also an important determinant of postnatal physical activity behaviour. These findings also add that knowledge about the physical activity guidelines is more important to increase physical activity during pregnancy, while knowledge about the benefits of physical activity in relation to maternal coping skills and family wellbeing is particularly important to increase physical activity among mothers, especially among new mothers in the postnatal phase.

7.1.5 Self-efficacy

In the first trimester, it was mentioned that tiredness and sickness reduced the level of physical activity related self-efficacy, which reduced time spent on physical activity. Even women who were very active pre-pregnancy reported a loss of control over their physical activity habits. These women mentioned not feeling able to be active during their first trimester. A comment indicative of this was:

"I was going to the gym probably 4 or 5 times a week before pregnancy and pretty much just stopped in the first trimester, because I felt too sick to do anything....My brain wanted to be [active], but I just physically couldn't do it. It sort of annoyed me that I couldn't do it because from going to the gym I know it makes me feel better mentally and physically and not being able to do that sort of made feeling sick a bit worse, because I knew that it wasn't helping anything" (Jaimee, 26-30 years, first baby, working, sufficiently active)

In the beginning of the second trimester participants who commonly expressed high levels of self-efficacy regarding meeting the physical activity recommendation were usually able to meet the recommendation throughout the second trimester, while women

who were uncertain commonly did not meet the recommendation. This indicates that physical activity self-efficacy may be an important determinant of physical activity behaviour during the second trimester. Participants who did not succeed in meeting the recommendation commonly struggled with being active on a moderate intensity and the frequency of 5 days per week, but commonly engaged in low intensity walking 3 times per week for longer than 30 minutes.

At the beginning of the third trimester, many participants had low levels of physical activity self-efficacy due to physical discomforts, which were expected to become worse in the following 3 months. Whether women were active throughout their last trimester seemed to depend to a degree on levels of physical activity self-efficacy. The physical activity self-efficacy levels appeared to mainly depend on the intensity of experienced physical discomfort.

Participants reported feeling confident at the end of their third trimester to meet the physical activity recommendation within 3 months after childbirth, because they would not have to carry as much weight anymore, and were motivated to get back into shape, leave the house and take their baby for a walk. However, feelings of uncertainty towards being able to meet the physical activity recommendation postpartum were also expressed:

“Well I’d like to think that it will be feasible but I’m not overly confident....everyone talks about the sleep deprivation and the struggle to get everything done and that’s referring to people that actually don’t have a business to run, but I still have the business to run. So I’m trying to be realistic” (Molly, 41+ years, first baby, single mother, working, insufficiently active)

Some women also reported not feeling able to engage in physical activity five times per week or knew from previous experience that they would struggle with physical activity in the first three postnatal months. Previous research has shown maternal self-efficacy to be higher in multiparous women³⁷⁴. Although not quantitatively measured, the multiparous mothers in this study did not appear to experience higher levels of physical activity self-efficacy or physical activity compared to primiparous mothers.

At three months postpartum, mothers expressed different levels of confidence in terms of meeting the physical activity recommendation in the future. Women who felt confident

mentioned the following reasons: “getting the baby outside is a priority”, “no longer working so plenty of time”, “my kids are going to day care now”, “I want and need to be active, so I would always find ways to make it work”, and “I have a friend to go walking with”. Women who did not feel confident reported the following reasons for their lack of confidence: “going back to work would limit time for physical activity”, “with a baby you have to stick to walking and I don’t like walking”, “it depends whether I can find someone to look after my baby”, “I will meet the duration, but I prefer low intensity exercise and I have too many things to do to be active five times per week”, and “I will try, but I’m not sure”. Other women stated not having any physical activity related intention:

*“I’m just sort of you know enjoying her being little and all those motherly things, rather than worrying about what I look like and meeting exercise recommendations”
(Julie, 21-25 years, first baby, insufficiently active)*

During pregnancy and postpartum, experiences of physical discomfort and tiredness strongly influenced women’s physical activity self-efficacy, which in turn was associated with their physical activity behaviour. In general, women’s expressed feeling of physical activity self-efficacy appeared to be low during the first trimester, higher during the second trimester and lower again during the third trimester. Women who had higher levels of physical activity self efficacy appeared to be more active during pregnancy. In the postnatal phase, participants’ physical activity behaviour did not seem to be influenced by self-efficacy that was expressed at the end of their pregnancy. However, at three months postpartum when participants reflected on their physical activity self-efficacy in the first few weeks after childbirth, findings show that physical activity self-efficacy was an important determinant of physical activity behaviour during the postnatal period.

No previous qualitative, published, peer-reviewed studies have been identified in the literature review that focused on physical activity self-efficacy levels during pregnancy and postpartum. The findings within this qualitative study therefore add data richness to existing findings of previous quantitative studies in relation to the physical activity self-efficacy among pregnant and postnatal women. Since no published, peer-reviewed studies were located that focused on physical activity self-efficacy during the first 3 postnatal months, these findings add in particular to the postpartum physical activity literature. Findings indicate that physical activity self-efficacy appears to be an important determinant of physical activity during pregnancy and postpartum. The findings within

this study also question previous research that indicated a steady decline of physical activity self-efficacy during pregnancy. The findings in this study showed a decrease in physical activity self-efficacy during the first trimester, an increase during the second trimester, a decrease during the first two postnatal months and a slow increase during the third postnatal month.

7.1.6 Sickness, Tiredness and Physical Discomfort

Physical activity during and after pregnancy was largely influenced by the degree women experienced sickness, tiredness and physical discomfort. The key findings are summarised in Table 7.4.

Table 7.4 *Summary of key findings related to sickness, tiredness and physical discomfort*

Stage	Findings
1st trimester	<ul style="list-style-type: none"> • Sickness and Tiredness due to hormonal changes
2nd trimester	<ul style="list-style-type: none"> • In the beginning: less sick and more energy • Physical discomfort and tiredness towards the end, 24-25 weeks: back and hip pain, stitches, swollen legs and feet, and a sense of pressure on organs such as bladder due to the increased size of the baby
3rd trimester	<ul style="list-style-type: none"> • Physical tiredness due to weight gain, muscle strain and lack of sleep • Physical discomforts: low blood pressure, dizziness, swollen ankles and feet, back pain, pressure on organs, and physical limitations due to size of abdomen
Postnatal	<ul style="list-style-type: none"> • Less physical discomfort unless the woman had a Caesarean section • Tiredness due to lack of sleep

In all phases during and after pregnancy, it was found that women who did not experience much sickness, tiredness or physical discomfort were more likely to be active. These women reported that physical activity made them feel better, both physically (e.g., more energised) and mentally (e.g., less stress and more refreshed). These findings seem to confirm and extend the findings in the existing literature, indicating sickness as an

important determinant during the first trimester, and tiredness and physical discomfort as important determinants of physical activity behaviour throughout pregnancy and the postnatal phase.

7.1.7 Priority

Throughout pregnancy and postpartum, findings showed that although physical activity was considered to be a priority, other higher priorities prevented participants from being active. Table 7.5 provides an overview of women’s priority beliefs as a determinant of physical activity during pregnancy and postpartum.

Table 7.5 *Key beliefs related to physical activity as a priority during pregnancy and postpartum*

Stage	Key beliefs
Throughout pregnancy and postpartum	<ul style="list-style-type: none"> • Sufficient PA and healthy nutrition is a struggle • Not gaining excess weight is the main goal and healthy eating holds more benefits for mother and baby and is less time consuming compared to PA • Leisure-time PA was a priority, but work, housework, and childcare were higher priorities and I did not have the time • PA is not a priority, because I have a healthy weight
1st trimester	<ul style="list-style-type: none"> • PA is important, but I felt too sick and tired to make it a priority
2nd trimester	<ul style="list-style-type: none"> • PA became more of a priority because I felt better again
3rd trimester	<ul style="list-style-type: none"> • I became more aware of the presence of my baby, making me realise I should be more active and prepare myself for birth • PA became more of a priority, because I had more time to make it a priority after maternity leave
Postnatal	<ul style="list-style-type: none"> • I’m more concerned with eating healthy, because unhealthy nutrition could to reduce the quality of my breast milk • My baby is my first priority now, I don’t have time for PA • PA is not a priority because I’m still recovering from labour • PA became more of a priority, because getting out of the house became more of a priority to stay sane, and walking helped with that • PA became more of a priority, because I’m keen to get my pre-pregnancy weight and shape back

PA= Physical activity

The mentioned shift from prioritising self to prioritising the baby was common among primiparous mothers and can be illustrated with the following comment by one of the participants:

"I guess my health priorities did change in a way, especially as far as exercising is concerned, because I think also because of time, because all your time is taken up with the baby and that is the most important thing, so I guess your health does suffer to some extent, because of it." (Jessica, 36-40 years, first baby, still recovering, insufficiently active)

Overall, participants who considered physical activity to be a high priority were more likely to be active and to meet the physical activity recommendation during pregnancy and the postnatal period. This finding confirms and extends the findings within the literature review, however adds to the literature as well. Within the published, peer-reviewed literature, the link between the lack of priority and physical discomfort was not identified. This study clearly showed that women often did not make physical activity a priority, because they did not feel physically capable.

7.1.8 Body Image and Self-esteem

Lower body image and self-esteem were only mentioned during the postnatal interviews and may therefore not be an important determinant of physical activity during pregnancy. Postpartum, participants commonly mentioned feeling "disgusted" with how their body looked after they had given birth. Loose skin, gained weight, stretch marks were commonly reported reasons for feeling unhappy with the way they looked:

"When I first looked in the mirror, it was like gross, but obviously your stomach is floppy as and it's still a big biggish because it hasn't gone down yet, so I just looked at myself and thought oh my God, that's so gross!" (Jaimee, 26-30 years, first baby, sufficiently active)

This feeling of dissatisfaction with their own body often resulted in feeling less confident about themselves as a person. Feeling fat, still having to wear maternity clothes due to being unable to fit into pre-pregnancy clothes, or labour-related soreness was commonly reported as something that made them hesitant to leave the house:

"In the beginning, I didn't feel very attractive, that's for sure. When you go out with your big pregnancy trackies on, because you are so sore and you still wear quite big pads and you don't want anyone to see them. When I left the house, I felt like an old bag.... But that's all fine now. I can wear my nice clothes again, I'm not living in my

trackies and even though I am still carrying a bit of weight, I feel quite good” (Jessica, 36-40 years, first baby, still recovering, insufficiently active)

Although such feelings commonly appeared to decrease over time when women were getting back to their pre-pregnancy weight and shape, some reported still struggling with the way they looked, which negatively impacted their self-esteem:

“Yeah, it does worry me and it makes me feel a bit yucky, and it does make me have a bit less confidence, definitely, and makes me think does my boyfriend still love me?” (Jaimee, 26-30 years, first baby, sufficiently active,)

Some women mentioned that although they felt disappointed with how their body looked directly after labour, it did not negatively affect how they viewed themselves. Within this group of participants, primiparous pregnant women commonly expressed being proud of themselves for being able to bring a baby into this world and that having a baby is worth the stretch marks, loose skin and weight gain. It must be also mentioned that not everyone was dissatisfied with the way they looked. Feeling good due to a quick recovery to pre-pregnancy weight and shape was commonly reported as well.

Apart from the first few weeks, body image did not seem to influence women’s physical activity behaviour postpartum. Women with a negative body image or low self-esteem were not more or less likely to participate in physical activity. Since, body image and self-esteem were also not mentioned during pregnancy, body image and self-esteem may therefore not be important determinants of physical activity behaviour during pregnancy or postpartum. This finding therefore questions the existing literature in which a few studies indicated a correlation between body image, self-esteem and physical activity behaviour among non-pregnant women and third trimester women.

7.2 Social Environmental Determinants

This section discusses the social environmental determinants identified within the longitudinal study. Table 7.6 provides an overview of these determinants and highlights whether they: 1) confirm and extend the existing literature to the Sunshine Coast, and to specific trimesters during pregnancy and the first three postnatal months; 2) question the existing literature, and/or 3) are novel and therefore add to the existing literature.

Table 7.6 *Longitudinal study findings compared to the literature review: Social environmental determinants*

Determinants	Women and mothers	Pregnant women	Longitudinal study
Social support			
<i>Emotional support from partner, family and/or friends</i>	93, 225, 244, 246, 247, 249, 250, 252, 254, 275, 277-279, 284, 291, 293, 303	104, 248, 252, 264, 265, 268, 291, 303	Confirms and extends existing literature, indicating its importance throughout pregnancy and postpartum, and adds that partner support was the most important source of support
<i>Instrumental support from partner, family and/or friends</i>	93, 225, 244, 246, 247, 249, 250, 252, 254, 275, 277-279, 284, 291, 293, 303	104, 248, 252, 264, 265, 268, 291, 303	confirms and extends the existing literature indicating that a lack of childminding and domestic support are important determinants throughout pregnancy and postpartum
<i>Support at worksite and job nature (active or inactive job, frequency and duration of breaks, fluctuations in shifts, inflexible)</i>	254, 256, 275, 277, 278, 290, 302		Confirms and extends existing literature in regard to its importance in the second trimester and the first part of the third trimester. However, questions its importance during the first trimester. It adds to the existing literature as no previous research identified support at work as a determinant of PA during pregnancy
<i>Instrumental support from health professionals: postnatal contact</i>			Adds to the existing literature by identifying lack of postnatal contact as a barrier to PA
<i>Belonging support: Companionship and social networks</i>	93, 230, 245, 246, 264, 277, 279, 280, 284, 285, 291, 296, 302, 303	104, 264, 268, 291, 303	Confirms and extends existing literature, indicating their importance as determinants of antenatal and postnatal PA, only when combined
<i>Informational support</i>	252, 303	104, 252, 265, 268-270, 273, 292, 303, 306	Confirms and extends existing literature, indicating informational support as a determinant of PA during pregnancy, and adds that the importance of informational support on postnatal PA depends on timing and on whether it includes information about how PA can facilitate coping with the multiple demands of motherhood and family wellbeing

Social inequalities			
Education, income, and racial differences	28, 93, 238, 245-247, 249, 250, 253, 254, 277, 278, 287, 290, 296, 297, 302, 375	268, 307	Questions its importance within this sample of Sunshine Coast pregnant and postnatal women
Costs of PA and childcare facilities	93, 238, 245-247, 249, 250, 253, 254, 277, 278, 287, 290, 296, 302	268	Confirms and extends the existing literature: high costs of childcare facilities are a barrier to PA, but affordable costs of PA facilities can also be a facilitator during pregnancy and postpartum. Findings also add to the existing literature: perception of costs as a barrier was not related to income, but to priority, and costs of PA and childcare facilities was only a barrier when the physical environment was perceived as PA unfriendly. Also, women do not want to use childcare facilities for their newborn baby
Gender inequality			
Time constraints	87, 93, 112, 225-227, 238, 244-248, 250, 252-254, 256, 257, 264, 268, 275-279, 281, 284, 288, 290, 291, 296, 297, 299, 309, 310	87, 104, 248, 252, 265, 270, 283, 291	Confirms and extends the existing literature, indicating its importance throughout pregnancy and postpartum
Social role strain	87, 93, 112, 225-227, 238, 244-248, 250, 252-254, 256, 257, 264, 268, 275-279, 281, 284, 288, 290, 291, 296, 297, 299, 309, 310	87, 104, 248, 252, 265, 270, 283, 291	Confirms, extends and adds. This is discussed in Chapter 8, section 8.2
Social norm	87, 225-228, 230, 251, 254, 276-278, 290, 291, 294, 302, 303, 308	87, 104, 250, 260, 261, 265, 291	Confirms, extends and adds. This is discussed in Chapter 8, section 8.2
Gender role expectations	112, 238, 244, 257, 264		Confirms, extends and adds. This is discussed in Chapter 8, section 8.2
Social cohesion and social capital	30, 34	28, 250, 257, 275, 288	Adds to existing literature indicating its importance during the postnatal phase. These findings also add that social media has the potential to increase social cohesion and PA among pregnant and postnatal women
Neighbourhood safety: perceived crime	28, 30, 244, 249, 250, 253, 254, 276-278, 284, 291, 294, 299, 302	248, 268, 283, 286, 291, 313, 314	Questions its importance within this sample of Sunshine Coast pregnant and postnatal women

PA= Physical activity

7.2.1 Social Support

The amount of social support, especially encouragement and companionship influenced participant's physical activity behaviour. The next sections discuss received emotional, informational, belonging and instrumental support and discouragement for physical activity during pregnancy and the postnatal period.

7.2.1.1 Emotional Support: Encouragement from Partner, Family and Friends

During the first trimester, some participants received emotional support for physical activity through verbal encouragement, mainly from their partner and their mother as most women did not tell anyone else about their pregnancy till after the first trimester. Women, who did not receive encouragement to be active, mentioned they did not need any support to remain active, their family and friends lived too far away to offer support, or mentioned they had not told anyone yet besides their partner that they were pregnant.

During the second trimester women had received emotional support from more sources (partner, mother, friends, physician and children), because after 14 weeks they had informed most people about their pregnancy. These women frequently mentioned that they had one or two people that would encourage them to be or remain active. Multigravida participants mentioned their children supported them inadvertently, by pushing them to take them to the park or engage with them in other activities. Women commonly believed that everyone in their social network would approve exercise during pregnancy as long as they were convinced it was safe, which frequently meant engagement in low intensity activities only. Others mentioned that sufficient physical activity during pregnancy was never brought up when talking to family or friends. They therefore did not know whether exercise during pregnancy would be approved.

Not much changed in the third trimester in regard to emotional support. However, partners who attended antenatal classes where walking was promoted, seemed to provide more encouragement during the last trimester. Walking was explained to assist with moving the baby downwards, and preparing the body for labour.

After childbirth, emotional support was received from partner, family, friends, and other mothers met in antenatal or parenting classes, mothers' groups or playgroups, or in the neighbourhood or church. Primiparous mothers felt especially overwhelmed and therefore in need for emotional support. The emotional support needs were reported to be met, even by the single participants:

"Yeah there was heaps of people who offered, even my neighbours were offering to help, so yeah there was heaps of support there if I needed it, and mothers' group and playgroup, and there's always a shoulder to cry on there if you need it too" (Lyndal, 26-30 years, second baby, active)

Although women received a lot of emotional support, encouragement for physical activity was not commonly mentioned as everything was focused on the baby during the first three postnatal months. Especially among primiparous mothers, physical activity seemed to be less important until a certain sleeping routine with their baby was established and a sense of control over their life was regained.

Throughout pregnancy and postpartum, partners seemed to be the most important source of support in terms of women's physical activity behaviour. However, encouragement for physical activity was not commonly received. It can be suggested that because of the previously mentioned lack of knowledge around the guidelines and benefits of physical activity during pregnancy and the postnatal phase, people tend to be more concerned than supportive towards physical activity especially during pregnancy.

The findings within this study confirm and extend the existing literature indicating that support from partner, family and friends can be an important determinant of physical activity during pregnancy and postpartum. The findings add that partner support appears to be the most important source of support.

7.2.1.2 Lack of Emotional Support and Discouragement: Partner, Family, Friends, Acquaintances, and at Work

In the first trimester, not much discouragement was perceived until more people were informed of the pregnancy. Participants then frequently received comments, intended as well-meant advice on physical activity, but not well received. Reprimanding comments on

insufficient physical activity behaviour were also perceived as discouragement. These women mentioned that during their second trimester, they had started to struggle with physical discomforts, which made them less mobile. Some people, usually the family-in-law or acquaintances in their neighbourhood, had reprimanded them for their insufficient physical activity:

“There have been a lot of women that were like: pay attention to your weight, you don’t wanna get too big, and I would be like: I can’t really help that at the moment love, I’m having a baby, and a lot of: you should be walking, you should be doing this or you should be doing that, which made me go: well you know we can’t always do what we should be doing” (Lauren, 26-30 years, first baby, working, insufficiently active)

Comments like these can be seen as a barrier to physical activity. When physical activity related advice from others was perceived as a personal attack, the advice was likely to be ignored.

During the second trimester, some women also felt annoyed, because their partner refused to accompany them on walks or offer to look after their other child, so they could be active:

“Yeah I don’t have support in that way...like my husband, not that I ever want him to hear, but he’s not that supportive as far as saying: oh look I’ll look after Jessie while you do your treadmill. He doesn’t, he won’t, he can’t, like they fight and they clash” (Gabriel, 31-35 years, second baby, not working, insufficiently active)

Concerns expressed by family members or partner were not perceived as discouragement, but rather a lack of encouragement. A comment indicative of this included:

“If I come home tired and say to my husband I’m so tired, then my husband will say just stay at home, so he will be encouraging me to stay, not to go. So as soon as he says that, then I’ll go okay, since he said that I can stay, I’ll stay home. I don’t need convincing, I just don’t have the motivation. It’s not discouragement, it’s more lack of encouragement.” (Linda, 21-25 years, first baby, working, insufficiently active)

Halfway through the second trimester, women mentioned that people at work, such as boss and colleagues, started to voice concerns regarding their physical activities at work or working hours. This aroused uncertainty among women about whether they should reduce their workload. These women generally continued their current working hours to ensure sufficient income, but became more mindful of their work activities so they would not injure themselves. However, other participants mentioned that concerns expressed by people at work had not influenced their behaviour or the way they felt about their

physical activity behaviour, of which some mentioned that these expressed concerns made them feel like an invalid:

"I appreciate them trying to. They're concerned that I don't overdo it, but sometimes, I feel like: I'm not an invalid, I am just pregnant, I am still capable!...I'm not in a wheelchair and not being able to move, I can still do my job!" (Judith, 21-25 years, first baby, working, insufficiently active)

Women with sedentary jobs also mentioned that in addition to a lack of encouragement to be active at work, there was also a lack of opportunity to be active during working hours.

During the third trimester, participants commonly reported that people at work (especially in physical jobs such as cleaning and hairdressing), partners, family, people at the gym or acquaintances became more discouraging towards physical activity due to their size. People commonly told participants to slow down, or questioned whether their current physical activity habits were putting their baby's healthy at risk. Although such admonitions made some women more cautious, these concerns were generally disregarded as signs of caring, because these women knew that what they were doing was safe.

Discouragement for physical activity did not stop after childbirth. Family members and acquaintances were commonly concerned about them doing too much after childbirth. Although, this was mostly seen as a demonstration of caring, love and kindness, it was also commonly perceived as annoying:

"It was more the people that were saying things towards a negative side were thinking that I was obsessed with getting back to my body weight. Because I was losing weight so fast, they kept telling me that I wasn't eating and stuff like that, but it was people that weren't around very often and didn't actually know that I was eating healthy" (Lauren, 26-30 years, first baby, active)

The literature review showed that discouragement, due to safety concerns, especially from family and partner, can decrease physical activity participation. Findings in this study show that although some women reduced their physical activity behaviour because of these expressed concerns, most women did not listen to these voiced concerns. It must be noted that no participant had mentioned that one of her friends had expressed concerns or was discouraging towards physical activity during or after pregnancy. Perhaps support from friends counteracted the influence of concerns and discouragement from others.

The findings confirm and extend the existing literature, suggesting that encouragement from partners friends and family are important facilitators of physical activity during pregnancy and postpartum. In regard to encouragement and opportunity for physical activity at work, findings show that a lack of encouragement and opportunity to be active at work seemed to be an important determinant of physical activity behaviour during the second and first part of the third trimester. However, it was not identified as an important determinant of physical activity behaviour during the first trimester as women had not informed their boss or colleagues yet of their pregnancy. It was also not a determinant of postnatal physical activity as women were naturally still on maternity leave. These findings also add to the existing literature as no previous research indentified support at work as a determinant of physical activity during pregnancy.

7.2.1.3 Instrumental Support from Partner and Family

Instrumental support consisted of: 1) help with household chores for rest and for physical activity purposes, 2) not receiving any help with chores and not needing any help, and 3) the need for childcare. A lack of instrumental support appeared to cause an increase in social role strain, which reduced physical activity.

In the first trimester, support for household activities was especially valued as most women mentioned the smell of food made them feel even more nauseous. Although the extra time was frequently used to take some rest, it also stimulated participation in physical activities. A comment that illustrated this included:

“My partner helped me with chores around the house and cooking and that helped me to have more energy left to go out and do things like going for walk in the park or for outings”(Libby, 21-25 years, first baby, not working, active)

Multigravidas did not commonly receive any instrumental support or no more than pre-pregnancy. Most of these women mentioned not needing any assistance with domestic chores, childcare, transport or other practical things.

Assistance with or taking over a certain amount of household chores could lead to a decrease of time spent on physical activity. However, if women would swap certain household chores with an activity they enjoy such as walks with their partner, it could increase their motivation and subsequently their physical activity behaviour.

Having children prevented women from joining organised exercise classes that did not allow children, but kept women active in terms of running around after them, walking them to school, or taking them to the park. Childcare was often perceived as too expensive, so most women stuck to activities they could do together with their child(ren). Exercise classes for both mother and child or free childcare services were reported by participants as something that would help them to increase their physical activity levels.

In the second trimester, some participants still received the same amount of practical support as the first trimester. Others mentioned receiving less support from their partner, because they were more capable, due to an increase in energy levels and a decrease in nausea:

“He used to do a lot more in the first [when I felt sick and tired all the time], but because I’ve been capable of doing it now, I’ve always beaten him to it. The hours he works, I used to just leave it, whereas now, I won’t just leave it, I’ll get up and do it” (Judith, 21-25 years, first baby, working, active)

Receiving more support during the second trimester was also commonly mentioned. These women frequently mentioned their household chores were now more equally divided than before, which gave them more time and energy for walking.

Participants who were single mentioned their parents did most of the household chores or reported dividing the daily chores equally. Women with partners who worked away, mentioned their partner was helping more when they were home. Women who received more support, expressed they also needed more support, commonly due to the increase in intensity and/or the number of experienced physical discomforts. It can therefore be concluded that when experiencing physical discomfort during the second trimester, instrumental support is important to ensure women do not injure themselves, while ensuring sufficient energy and motivation for more enjoyable activities.

In the third trimester, participants were supported by their partner, mother, mother in law, and other family members to complete chores such as cleaning, cooking, childcare, grocery shopping, and transportation:

Yeah definitely [received instrumental support], especially since I haven’t been very well. My partner is really great, he does loads, and like I said my mum always comes up and runs me everywhere, so I’ve been very lucky, I’ve got a lot of support” (Jessica,

36-40 years, first baby, active until 33 weeks when she took maternity leave from an active job)

These participants commonly mentioned that their partner was sharing the domestic workload fairly.

However, some participants commented that their partner was not willing to do any domestic chores or share the childcare responsibilities:

My hubby, he's not the domestic type. He tries to be a little bit but he won't be, he certainly won't be coming home from work and then bathing the babies and making their dinner and putting them to bed and reading to them and all that, that just would not happen....The hubby keeps saying "Don't worry about the housework, don't worry about it, don't worry about it", but it was getting filthy and someone's got to do it" (Gabriel, 31-35 years, second baby, not working, insufficiently active)

Although some of these women wanted to do all the housework by themselves, some reported they would have liked to receive more support. These women mentioned that housework and childcare seemed to take up all their energy, leaving no energy or motivation for walks or other activities they enjoyed previously.

After childbirth, levels of instrumental support had commonly remained the same. Religious participants mentioned that after childbirth members of the church came over every day with food for the first 2 weeks. Playgroups also offered a type of childcare support when other options were not available:

"Yes, I was out [to the playgroup] all the time. Because if XX couldn't help me out and XXX couldn't help me out, so with three children, sometimes it's easier to go do something because then they can run around and exhaust themselves and you've got people around you, it's a lot easier" (Leanna, 36-40 years, third baby, insufficiently active)

Multiparous mothers commonly reported that no extra support (compared to pre-pregnancy) with chores around the house or cooking was needed. These women reported that because they had been through the postnatal phase before, they were able to cope with everything by themselves or mentioned that household chores were fairly divided among all family members.

These findings confirm and extend the existing literature indicating that support with childrearing and domestic chores are important determinants of physical activity behaviour throughout pregnancy and postpartum.

7.2.1.4 Instrumental Support from Health Professionals: Postnatal Contact

In the postnatal phase women commonly mentioned a lack of postnatal contact with health professionals as a barrier to physical activity. Participants who had their first child in a different country (England or New Zealand) reported that the Sunshine Coast lacked postnatal services. One participant, who was originally from New Zealand, mentioned she wished the Sunshine Coast had a “Plunket” service. Another participant from England also reported that the Sunshine Coast lacked good postnatal services and that much more support was provided in England in terms of home visits by midwives or nurses. Women who expressed a lack of home visit services addressed this lack as an important barrier to postnatal physical activity behaviour. Uncertainty regarding their baby’s health and wellbeing and low levels of maternal self-efficacy prevented them from getting into a peaceful state of mind that was perceived as needed in order to consider increasing physical activity levels.

This lack of postnatal contact was also identified in the Review of Maternity Services in Queensland³⁷⁶ in 2005, which resulted in the implementation of the Universal Postnatal Contact Initiative (UPNC). The UPNC initiative was designed to increase the amount of postnatal contact women receive after being discharged from a public hospital. Public hospitals across the state received funding to ensure that all women receive at least one phone call or visit by a midwife or nurse after returning home. However, in 2010, the evaluation of the effectiveness of the UPNC initiative showed that of the 229 respondents who had a baby at the regional hospital used in the longitudinal study for recruitment purposes, only 62% received a call and only 4% were visited at home by a nurse or midwife within 10 days after being discharged³⁷⁷.

Previous research did not identify postnatal contact as a determinant of physical activity behaviour among postnatal women. The finding that a lack of postnatal contact with health professionals was a determinant of postnatal physical activity behaviour therefore adds to the existing literature.

7.2.1.5 Belonging Support: Companionship and Social Networks

Throughout pregnancy and the postnatal period, physical activity companionship and social interaction have been mentioned to encourage physical activity. Women identified companionship as a facilitator of physical activity behaviour, because it offered the opportunity for social interaction, which made physical activity more fun. Women who experienced a lot of physical discomfort also mentioned that companionship during activities made them feel safer:

“Sometimes I’d like to go and do something, but scared of doing it by myself because if I hurt myself, I can’t go home or do anything like that. So having someone there that is supportive and will actually go with me to do things is probably the only thing that would help” (Lauren, 26-30 years, first baby, working, insufficiently active)

Companionship and encouragement to continue physical activity was also received from sport instructors and from fellow sport club or gym members.

In relation to social networks, participants often joined social groups such as children’s playgroups, bible study groups, online maternal support forums, and social groups formed by women via www.bubhub.com.au, social.kidspot.com.au, www.huggies.com.au or via Facebook pages for Sunshine Coast mothers. These groups or forums provided women with highly valued social interaction and support. Comments illustrating this included:

“The maternal forum, they run through all the stages and just general chitchat and you end up in groups with the ladies, who are due in the same time as you and can talk about what you’re going through and what’s going on and stuff, it’s really good” (Julie, 21-25 years, first baby, not working, insufficiently active)

Although some women mentioned going for walks with some of the women met in these groups, it commonly did not lead to more physical activity as physical activity was rarely discussed within these social groups.

In the second trimester, participants also commonly mentioned they had signed up for an antenatal class in their third trimester or were planning to join a mothers’ (walking) group after childbirth. Some of these women mentioned that they would have liked to join these antenatal classes at an earlier stage, so they could make new friends to walk with before they were due:

“I feel like they should have started already...Then you could meet people that are in the area, are pregnant and are in the same situation as you that maybe could motivate you. You could meet up with them if they were close by and walk together....[Now] I’ll

finish about less than two weeks before I am due and I mean my husband was six weeks early so it's ridiculous!" (Linda, 21-25 years, first baby, working, insufficiently active)

In the third trimester, antenatal classes were commonly perceived as supportive and offered an opportunity to meet new friends with babies, who are due around the same time. However, opportunities to socialise were reported as limited due to the structure of the classes.

Participants who did not mention social support as a motivating factor for physical activity, reported internal motivation and the need to keep working for financial reasons, or the duty to continue daily activities as normal as their key reasons for participating in physical activity:

"I think it was probably me [internal motivation]....it was a bit of both really but it was really me, and my sort of wanting to get out and walk and get out in the open, and be out in the fresh air, and so things, but also like it really helped like I'd be like I want to go, but and then my husband would say oh come on I'll come with you, and that would be the trick that we'll say all right let's go" (Jessica, 36-40 years, first baby, sufficiently active until 33 weeks when she took maternity leave from an active job)

In the postnatal phase, support from previously described social groups and internet forums were commonly mentioned by participants in relation to enjoying the social aspect of these groups, the friendships they made, and the expectation that in the future their children could play together. Especially primiparous mothers valued these support groups greatly. Talking about the things they were going through with women in the same situation seemed to help these women in coping with all the new challenges they had to face:

"...it definitely gave me the sort of inclination to want to go out and the company and just the chatting with the mums like you know, finding out okay that's normal, because your baby does that too, so yeah it really, really helped, I've really enjoyed it." (Jessica, 36-40 years, first baby, still recovering from labour, insufficiently active)

Although some women joined groups for social reasons only, some also organised walks or other physical activities with their mothers' group or other social groups, which was enjoyed because of the company of other women in the same situation. Although it was experienced as an effort to get everything organised, to leave the house, and make the drive over to the meeting point, they were always glad they had done it afterwards,

because it made them feel better and happier:

“the last couple of weeks I have just started to go walking with the ladies I met at the baby club and I found that once I’ve done it, once I get out there, it is sometimes a struggle to get there, but after I feel like “Ow, I’m so glad I have done this!” and I come home feeling much better” (Jessica, 36-40, first baby, still recovering from labour, insufficiently active)

However, some participants mentioned they first had to get their daily activities organised and into a routine before feeling capable to join anything. Feeling awkward about joining a group of women they did not know, having negative prejudices about mothers’ groups were also mentioned as reasons for feeling unsure about joining or not wanting to join a mothers’ group:

“If I had closer friends living in my community I probably would, but as far as going out and seeking a mother’s group with people I don’t know, I didn’t have too much motivation to do that I suppose.....and I’ve heard they’re a bit clicky to be honest, so I sort of thought I don’t really want to put up with that” (Celeste, 31-35 years, first baby, active)

In addition, some participants had not joined any social groups for mothers due to past negative experiences. Gossiping among mothers, their child not getting along with other children, or lack of self confidence were reported reasons for not wanting to join any mother related support groups:

“I’m sure there are other mothers’ groups that would have been better, but I haven’t joined any. And a lot of it is probably a self-confidence thing as well. You know, I don’t have any, so it’s difficult...I didn’t really want to throw myself out there into any more mothers’ groups” (Gabriel, 31-35 years, second baby, insufficiently active)

Others mentioned preferring companionship during walks or other activities from friends and family and did not feel a need for new social contacts.

Although it might not motivate all women, group support appeared to be very valued and needed especially if formed with women who are due around the same time and who live in the same neighbourhood. Providing women with the opportunity to join exercise groups with women who have similar due dates and that allow social interaction within the group, may significantly increase women’s physical activity behaviour during pregnancy and postpartum.

These findings confirm and extend the existing literature indicating that companionship as an important determinant of physical activity behaviour throughout pregnancy and

postpartum, especially if there is opportunity for social interaction. Social networks did not appear to be an important determinant on its own.

7.2.1.6 Informational Support: Sparse and Inconsistent

During pregnancy, women reported having received helpful information on beneficial activities, what activities to avoid, and how to prevent overheating. Postpartum, women had received advice about when to start engaging again in physical activity, and about when to slowly start increasing the intensity of their activities. This information was received from health professionals in the hospital, their physician, mothers in mothers' groups, parenting groups or playgroups, and/or from sources such as websites, internet based forums, books and magazines.

However, a lack of professional guidance was more common. Table 7.7 provides an overview of the key responses in relation to a lack of informational support from health professionals. One participant explained how a lack of advice from her physician made her reduce her physical activity habits:

"No, I have got no idea really. I probably haven't had a good pregnancy Dr. I have been going to the same doctor as I had when I was 16 years old and when I asked him about activity, he said 'Yeah, just take it easy'.....I was afraid that if I would have continued jogging 8 laps around the oval that I would be doing some harm to it and I might have lost it." (Celeste, 31-35 years, first baby, working, insufficiently active)

Women also reported a lack of knowledge among fitness professionals. One lady mentioned that her personal trainer told her to come back after the first trimester, because of the risk of a potential miscarriage. Others commonly mentioned that staff was not aware of the physical activity guidelines during pregnancy. A lack of information was especially common among multigravida and multiparous women. It can be speculated that health professionals falsely assume that these women still remember all the information they were provided with during their first pregnancy.

Table 7.7 Summary: lack of informational support from health professionals

Stage	Amount and quality of PA information
Pregnancy	<ul style="list-style-type: none"> • Women commonly mentioned that no information about PA was received from doctor or midwife • Some women mentioned no information was received about the importance or benefits of PA until they were diagnosed with gestational diabetes • Multigravidas mentioned they were not weighed during every doctor’s visit anymore, which used to be a standard procedure • Pregnancy books, brochures or pregnancy websites provided very limited information about PA • A lack of information was especially reported by multigravidas • The main focus was on not ‘overdoing it’ rather than remaining active, without being told how ‘overdoing it’ was defined • Books and other printed or online sources were frequently perceived as unreliable sources • Checkups with doctors were too short and not frequent enough to answer all questions • Participants commonly reported to have received a lot of information related to the baby, but not much about how to look after their own health once the baby is born • Women who had moved during this pregnancy or lived in other places during prior pregnancies, mentioned they had received much less information at the Sunshine Coast regional hospital
Postnatal	<ul style="list-style-type: none"> • Lack of information about postnatal PA was commonly mentioned • Participants also reported being told to go for walks, to help prevent postnatal depression • Women lived in other places during prior pregnancies mentioned that they received much more information in those other places than at the Sunshine Coast regional hospital • Most information received was about the baby rather than self-care • Information about when to start exercising after childbirth and how much PA would be good to do in terms of frequency, duration and intensity, was reported to be lacking • Information on beneficial activities in terms of strengthening muscles weakened during pregnancy and improving fitness were also reported to be lacking

PA= Physical activity

Postpartum, participants mentioned advice from doctors or midwives in relation to physical activity to be absent or limited. This was particularly concerning for women who had a Caesarean section or stitches due to tearing:

“The doctor said you’ve just got to slow that down and I’m like but I have things to do. But it was about me cleaning my house and stuff and I’m like who else is going to clean my house but me, my partner works, no one else is going to do it” (Judith, 21-25 years, first baby, insufficiently active)

These findings show that that advice from health professionals has to be more comprehensive and specific. Women have to be informed of the activities that are beneficial and the activities they should avoid, including safe intensity levels. Women should also be informed of the importance of following the advice in terms of avoiding complications and in terms of physical and psychological health benefits, and social and family wellbeing.

Inconsistency and Contradiction

As well as a lack of information, the information received came from many different sources and was therefore often inconsistent and contradictory. During pregnancy, information was inconsistent or contradictory in terms of type of activities, intensity levels, and duration during pregnancy. Postpartum, information was inconsistent or contradictory in terms of when to start engaging in physical activity, and when to start increasing physical activity intensity. This caused a lot of confusion, resulting in hesitation about continuing pre-pregnancy physical activity habits:

"I had to weigh it all up, because I heard mixed things about exercise during pregnancy...Just any light to medium exercise, nothing too full on, but then I also read that it's okay to continue with what you were doing before" (Karen, 26-30 years, first baby, studying, insufficiently active)

Information Provision: Timing

Receiving information about postnatal physical activity directly after birth was perceived as ineffective. Women reported feeling too overwhelmed by labour and the overload of information and not ready yet for increasing their physical activity habits at that stage, which made the information irrelevant. Especially primiparous mothers mentioned an overflow of information, which was all received at once at the hospital. These women recommended receiving the information more spread out over time as it would increase the likelihood of reading and remembering the information.

Impact of Information on Antenatal and Postnatal Physical Activity Behaviour

Pregnant participants commonly mentioned they highly respected their doctor and midwife and therefore would follow their advice if advised to engage in more physical activity, especially if it would benefit their baby's health. The advice to 'take it easy' or minimal information about antenatal physical activity, often resulted in uncertainty about physical activity during pregnancy. Findings also showed that doctors and midwives appeared to have a more noteworthy influence on women's physical activity behaviour during pregnancy than information from other sources.

A lack of information was especially apparent among multigravidas and multiparous women, which shows that many health professionals may make the false assumption that multigravidas and multiparous women know it all. Findings related to a lack of quality and consistent information confirm the findings in the literature review, indicating that few doctors gave pregnant women advice on physical activity and that doctors who did provide women with information, often based their advice on outdated guidelines.²⁷³

However, participants also mentioned that it was not the lack of information that prevented them from being active, but barriers such as tiredness, physical discomfort and lack of time. Other women also reported that their physical activity behaviour did not depend on external information, but on what their own body told them.

However, it must be noted that it is difficult for participants to draw conclusions regarding the impact of knowledge on their physical activity behaviour, if unaware of the information. These findings therefore appear to confirm and extend the existing literature, indicating that informational support is an important determinant of antenatal physical activity behaviour. This study also confirmed the findings of a previous study indicating that women commonly did not receive comprehensive advice about antenatal physical activity until diagnosed with gestational diabetes.²⁵² In relation to the postnatal phase, these findings add to the existing literature by pointing out that informational advice can potentially influence postpartum physical activity behaviour if information is received during the third trimester or after the first few weeks, and if information is related to how physical activity can facilitate family wellbeing and coping with the multiple demands of motherhood. Findings in this study indicated that women are

commonly too overwhelmed after childbirth to take in all the information they were provided with, and therefore need to receive information at the hospital and a few weeks after being discharged.

7.2.2 Social Inequality

Income, race, education, age, marital status, education and work did not appear to be related women's physical activity behaviour. However, it must be noted that apart from one participant the study sample consisted of Caucasian women. Investigation of possible discrimination and isolation based on race was therefore not possible. These findings may therefore only relate to the Sunshine Coast or similar coastal and hinterland areas with a majority of Caucasian women. However, costs related to physical activity and childcare facilities were often mentioned as an important barrier to physical activity during pregnancy. Lack of time is also discussed within the following sections, since it is viewed as a socially constructed concept that can lead to social inequality; mothers often mentioned that, because of all the things they were expected to do, they had no time for self-care such as physical activity.

7.2.3 Income and Costs of Physical Activity and Childcare Facilities

During pregnancy and postpartum, financial constraints and the costs of physical activity and childcare facilities were commonly mentioned to be barriers of physical activity. During pregnancy, participants expressed a need to keep working for as long as possible or to cut back in expenses in order to prepare for the impending costs of caring for a(nother) child. Women concerned about costs, mentioned they needed a supervised physical activity class for pregnant women in order to feel safe about the amount of physical activity they are doing and in order to feel motivated to be active. However, the high costs of exercise facilities, classes and/or childcare prevented them from joining. Comments indicative of this were:

“it's a bit hard to go and join a gym, especially if you're not working, you are watching your money a lot more closely...and you can't just sign up for a 12 month membership at a gym...you don't know what's gonna happen in the future and when you are feeling morning sick and therefore can't go, it's just money down the drain” (Jaclyn, 36-40 years, second baby, not working, insufficiently active)

“Well the children and childcare [made it hard to be active], because I can’t afford to keep them in childcare and we’re from the UK, so I don’t have any family support and my husband is at work till 6:30 in the evening” (Leanna, 36-40 years, third baby, insufficiently active)

After childbirth, participants mentioned wanting to join mother-and-baby classes, because they would not leave a newborn baby at a childcare facility. However, the costs of such exercise classes or groups were commonly perceived as too expensive:

“I think a lot of people would do more activities with their children if it didn’t cost so much, because I would love to take him to those aqua classes that are for infants, but they’re just so goddamn expensive, and especially when you’ve just had a baby you’re not working anymore, so you don’t have a lot of money...mums don’t do it because they can’t afford to” (Judith, 21-25 years, first baby, insufficiently active)

Multiparous mothers not only had to worry about the costs of mother and baby classes, they also had to worry about the costs of childcare for their other child(ren) while attending such exercise classes. This made it impossible for most multiparous women to attend such classes. However, some women mentioned that paying for a gym membership or exercise classes upfront motivated them to actually go to the gym or classes ‘to get their money’s worth’. This was also confirmed by a previous study among women.²⁴⁷

Findings confirm and extend the existing literature indicating that costs of childcare facilities seem to form an important barrier to physical activity during pregnancy and postpartum, while costs related to physical activity can function as both a barrier and a facilitator. It must be noted that costs of childcare facilities was only an important determinant among multigravidas and multiparous mothers, because women did not want to leave their newborn at a childcare facility during the first three postnatal months.

An interesting finding was that whether women perceived costs of facilities as a barrier, did not depend on income, but on priorities. These women commented that even though they would enjoy joining a class and even though they thought it would be good for their health and their baby, their budget was limited and saving money for the baby was a higher priority.

Another interesting finding was that women, who commented that gyms and or childcare were too expensive, commonly lived in an environment that was perceived as physical activity unfriendly. This could mean that a lack of affordable exercise facilities is only a

barrier of physical activity behaviour during and after pregnancy if footpaths, nice scenery, parks or other outdoor facilities are not available (see section 7.3.2). Costs of childcare facilities do not encumber physical activity among primiparous mothers as women did not want to leave their baby at a childcare facility during the first 3 postnatal months. These findings have not been addressed within the existing literature and can therefore be seen as novel findings.

7.2.4 Time Constraints

During pregnancy, a lack of time was commonly reported as a physical activity barrier. Multigravida women mentioned to have limited time for physical activity behaviour due to having to care for others or having to fulfil other roles, while primigravidas struggled to combine work with making time for partner and accommodating sufficient physical activity:

*“...finding the time to actually do it, because I work full time still and I was still doing some uni work, plus trying to have a relationship. You just have no time and when you’re trying to make sure you still socialise and still do all that, you just run out of time...to actually go for my walks, or go out and do stuff with my partner because we work different hours as well, so it’s really hard to try and work out time together”
(Judith, 21-25 years, first baby, working, active)*

Among participants who did not partake in any exercise classes or sports, it was reported that they would like to join an exercise class or group for pregnant women, but were unable to find anything or mentioned these were only offered in the morning when they had to get their kids ready to bring them to school or in the late afternoon when they had to get dinner ready. Women who worked mentioned exercise classes were always at 5pm or 6pm, while they needed classes to start after 6:30pm in order to be able to make it. The lack of classes at different times of the day was perceived as a barrier to attending such classes.

In the third trimester, findings from primigravidas indicated that whether they had time for physical activity mainly depended on when they took maternity leave. Women, who worked until 2 weeks before their due date or later, mentioned being too busy with getting things finished at work and getting the baby room ready to even consider maintaining a sufficient level of physical activity. Participants, who went on maternity

leave earlier, were more active in their third trimester compared to the second, because they had more time.

Postpartum, participants mentioned to be even more limited in time during this period. Primiparous participants struggled more than multiparous women in finding time for themselves. Primiparous mothers expressed that the baby took up all of their time and described the first few weeks as a stressful time, making physical activity the least of their worries:

"...it's overwhelming. I had a few days where I had a bit of a teary, because in the first couple of days when I was still in hospital, the whole breastfeeding thing wasn't going too well, and just how it is such an insane life change, and you never realise how much it changes your life until you actually have the baby. I was totally delusional..." (Jaimee, 26-30 years, first baby, sufficiently active)

Multiparous women mentioned to struggle initially with accommodating the baby in their family's daily routine, but seemed to find a routine much quicker due to a different attitude:

"...he can't run our lives. I mean to an extent he can, but you know we can't be sitting there with him all the time, everything else has to go on as well" (Carol, 31-35 years, third baby, active)

Participants have also mentioned breastfeeding responsibilities every 2-3 hours as a time consuming task and as something that had to be done at home, especially by young primiparous women. For these women, breastfeeding in public was too embarrassing and a lot more stressful, because they felt stared at. Having to breastfeed every 2-3 hours, only left on average a 1.5 hour window to get themselves and their baby organised, go out and come back.

It can therefore be concluded that lack of time, due to the expectation they had to do it all by themselves, was an important determinant of physical activity behaviour during pregnancy and postpartum. These findings confirm and extend the existing literature. As mentioned in Table 7.6, social norm, gender role expectations and social role strain are discussed in Chapter 8.

7.2.5 Social Cohesion and Social Capital

Social cohesion and social capital was not explored during pregnancy for reasons explained in Chapter 3, section 3.4.8. However, during pregnancy women did report that the use of social media (see section 7.2.1.4) resulted in new established networks, which in some cases resulted in new friendships with other pregnant women and mothers in their neighbourhood. Some of these women had coffees with women they had met via social media and some became walking buddies. Social media therefore has the potential to not only increase social capital, but also physical activity among pregnant women and mothers.

In relation to the postnatal phase, feelings of community connectedness were commonly reported among participants and appeared to be associated with meeting the physical activity recommendation. Women who reported to have a sense of community connectedness commonly knew a large number of people in their neighbourhood. They also frequently exchanged favours with neighbours, and mentioned it was easy to make new friends:

“Definitely well I was only saying on the weekend that living in this little town here you do more things with the community...so yeah huge sense of community around here.... Just being involved in the playgroup and volunteering as well...you just know everyone and I guess that’s the benefit of living in a smaller town” (Lyndal, 26-30 years, second baby, active)

Other participants, who mentioned not feeling a sense of community within their neighbourhood, mentioned feeling unsafe, that people kept to themselves, a lack of families in their neighbourhood, or that they were new to the neighbourhood. These women mentioned that older women were always keen to have a chat when they were walking with their baby, but other mothers with their children kept to themselves. There seemed to be a social norm in these communities to keep to yourself. These participants mentioned never talking to strangers in their neighbourhood other than staff in shops. It was uncommon for women living neighbourhoods with low levels of community connectedness to meet the physical activity recommendation. It appeared that social capital in terms of community connectedness was an important determinant of postnatal physical activity, especially walking.

The literature review only identified one study that addressed the positive association between social cohesion and physical activity among women with no previous research identified that focused on the possible relationship between social capital or social cohesion and physical activity behaviour during pregnancy or postpartum. The findings within the longitudinal study therefore add to the finding of Ball et al,²⁸ who found that women who reported higher levels of community connectedness (i.e., knew more neighbours), social participation, interpersonal trust, and norms of reciprocity, were more likely to engage in leisure-time physical activity.

These findings add to the existing literature by indicating that social capital in terms of community connectedness is an important determinant of physical activity behaviour during the postnatal period. These findings also add that social media has the potential to increase social cohesion and physical activity among pregnant and postnatal women.

7.2.6 Neighbourhood Safety: Perceived crime

Perceived crime was not commonly mentioned during pregnancy or postpartum, except in relation to the location of footpaths and vegetation around footpaths. Footpaths that were out of sight of the main road and were surrounded by a lot of vegetation were avoided as women were afraid that potential harassers or robbers would be hiding in the vegetation. However, this had more to do with their sense of vulnerability than actual neighbourhood crime rates, and none of these participants mentioned they had heard about anyone who was harassed or robbed on those paths. In addition, these perceptions of crime did not seem to be associated with women's walking behaviour as they reported to just simply use other footpaths.

Findings therefore confirm the results of the literature review, indicating that perceived crime may only be an important determinant of physical activity among women in neighbourhoods with high crime rates. These findings therefore question the importance of perceived crime as a determinant of physical activity behaviour among Sunshine Coast pregnant and postnatal women. The importance of location and maintenance of footpaths are discussed in more detail in section 7.3.4.

7.3 Physical Environmental Determinants

This section discusses the physical environmental determinants identified within the longitudinal study. Table 7.8 provides an overview of these determinants and highlights whether they: 1) confirm and extend the existing literature to the Sunshine Coast and to specific trimesters during pregnancy and the first three postnatal months; 2) question the existing literature, and/or 3) are novel and therefore add to the existing literature.

Table 7.8 *Longitudinal study findings compared to the literature review: Physical environmental determinants*

Determinants	Women and mothers	Pregnant women	Longitudinal Study
<i>Environmental aesthetics (i.e., availability of green or open spaces and mixed land use, physical disorder, and level of appreciation)</i>	250, 251, 275, 277, 278, 325	265, 268, 314	Confirms and extends findings regarding aesthetics as an important determinant of walking. Adds by specifying which factors within aesthetics were most important in terms of facilitating PA. However, questions physical disorder as a determinant of PA among Sunshine Coast pregnant and postnatal women
<i>walkable and cyclable neighbourhood (i.e., path availability, accessibility and connectivity, and walkable or cyclable destinations)</i>	225, 246, 249-251, 254, 277, 278, 284, 325	246, 265	Confirms and extends existing literature, indicating its importance during pregnancy and postpartum. However, adds that during the first and second trimester, proximity to facilities only appeared to be an important determinant among multigravidas
<i>Availability of exercise facilities and home equipment</i>	246, 249, 250, 254, 256, 275-278, 284, 291, 302, 325	268, 283, 291, 296	Confirms and extends the existing literature, indicating that home equipment was not an important enabler, while availability of appropriate PA facilities was an important enabler of PA during pregnancy and postpartum. However, adds that availability of PA facilities was only an enabler when the neighbourhood was perceived as PA unfriendly, and if criteria related to PA facilities were met

Transport	93, 247, 249, 250, 256, 277, 291, 302	265, 268, 291	Questions its importance among Sunshine Coast pregnant and postpartum women
Neighbourhood Safety	226, 249, 250, 254, 275, 277, 278, 284, 288		Confirms and extends existing literature, indicating that traffic-related safety is an important determinant of PA during the third trimester and postpartum, and adds that isolated footpaths from the main road surrounded by high vegetation are not commonly used by pregnant and postnatal women, and that during the first and second trimester, traffic safety only appeared to be an important determinant of physical activity among multigravidas
Weather conditions	246, 254, 277, 278, 290, 291, 296, 299	265, 268, 291	Confirms and extends existing literature, indicating its importance throughout pregnancy and postpartum

PA= Physical activity

7.3.1 Neighbourhood Aesthetics, Walkability and Cyclability

Women's perceptions of neighbourhood aesthetics, walkability and cyclability, or availability of exercise facilities did not change much over time. Participants commonly mentioned beautiful scenery in close proximity such as the beach, parks, forestry, rivers or lakes, and the availability of footpaths, cycle lanes, clean streets, trees for shade, and living in a quiet area as facilitators of physical activity. Having shops, cafés and other facilities in close proximity were not commonly mentioned as a facilitator of physical activity during the first and second trimester among primigravidas. During this time, the proximity of such facilities appeared to be more appreciated by multigravidas. However, proximity to facilities became more important for primigravidas from the third trimester onwards. After childbirth, having these facilities nearby was commonly mentioned as the most motivating factor to be active in their neighbourhood:

"There are just walking paths everywhere and it leads to everywhere like the plaza and so many different shops and the park and it seems like you want to go walking because you want to go to these places kind of thing"(Akiko, 26-30, Japanese, second baby, active)

Hills provided a good opportunity for a workout for some, while others perceived hills as something that prevented them from walking in their neighbourhood, especially as pregnancy progressed. Other commonly reported barriers to physical activity related to aesthetics, or walkability and cyclability including a lack of footpaths, cycle lanes, parks, construction work, and boring or unpleasant scenery:

“...I won’t walk around the estate, because I’d just rather go somewhere that is not boring like down the beach or the gym or whatever” (Jaimee, 26-30 years, first baby, working, sufficiently active)

It appeared that environmental aesthetics and walkable environments and outdoor exercise facilities had a noteworthy influence on walking throughout pregnancy and postpartum. However, proximity to facilities such as shops, cafés and library only appeared to be an important determinant of physical activity during the third trimester and postpartum. During the first and second trimester, proximity to facilities was only important among multigravidas. There was not enough evidence to mention anything regarding a possible relationship between walkable, cyclable neighbourhoods and cycling or overall physical activity.

These findings therefore confirm and extend the existing literature indicating that environmental aesthetics had an important influence on walking during pregnancy and postpartum. These findings also add to the existing literature as these highlights which aesthetical factors and factors improving walkability in a neighbourhood influenced walking during pregnancy and the postnatal period. However, this study questions physical disorder as a determinant of physical activity among Sunshine Coast pregnant and postnatal women as no physical disorder other than construction work was reported, which did not influence women’s physical activity behaviour.

7.3.2 Availability of Exercise Facilities and Home Equipment

In regard to exercise facilities, proximity to parks, pools, exercise groups or classes (such as Zumba, yoga and walking groups), sport grounds, tennis courts, gyms, and playgrounds for children were perceived as facilitators of physical activity. However, it must be noted that having such facilities in close proximity did not necessarily mean that participants perceived this as a motivator. Some mentioned that although their building complex had

pool, gym, and tennis court, they still preferred to go for a walk somewhere quiet, because they did not like to be active while surrounded by other people. A lack of exercise facilities, such as exercise classes specific for pregnant women, appeared to be an important barrier to physical activity during pregnancy. However, it must be noted that not just availability but also proximity, costs of such activities and the costs of associated childcare are important. This was discussed in section 7.2.3. In the postpartum period women mentioned a lack of mother and baby exercise groups. During this period, availability of indoor exercise classes was only an important facilitator if these consisted of affordable mother and baby classes (as mothers did not want to put their baby into childcare). In addition, women who mentioned a lack of exercise facilities as an important barrier to physical activity, commonly lived in a neighbourhood that was perceived as physical activity unfriendly. These findings confirm and extend the existing literature, indicating availability of exercise facilities as an important enabler during pregnancy and postpartum, however add that this only appeared to be an important enabler among women who were living in physical activity unfriendly neighbourhoods and if other criteria related to exercise facilities (e.g., costs, proximity, and specific to pregnancy or mother with babies) were met.

Physical activity equipment at home, such as a treadmill, was not commonly mentioned. These findings confirm and extend the existing literature, indicating that physical activity equipment is not an important determinants of physical activity behaviour during pregnancy and postpartum.

7.3.3 Transport

Lack of transport including both car and public transport, and logistical issues have not been mentioned as barriers to physical activity. This therefore questions the existing literature in relation to its correlation with physical activity behaviour during pregnancy and postpartum. However, it is not clear why participants did not mention transport-related factors; whether participants were satisfied with public transport or all had a car of their own, or whether exercise facilities were within walking distance, making public transport a surplus to requirements. In addition, since most women mentioned walking

as their preferred leisure activity, transport to indoor or outdoor exercise facilities was therefore less needed with this group of participants.

7.3.4 Neighbourhood Safety

Primigravida participants expressed more neighbourhood-related safety concerns towards the end of their pregnancy and after childbirth. Multigravidas also commonly expressed safety concerns in relation to their children's safety.

Commonly expressed safety concerns included a lack of safe parks or playgrounds and too narrow or unsafe footpaths. A quiet neighbourhood with light traffic, a sense of neighbourhood safety, and the availability of good playgrounds that are fenced or away from busy traffic and in close proximity were highly valued, especially by mothers with young children:

"I think [traffic safety is important to me] mostly because I have children, so child safety and cars and yeah just the speed limit of people driving around the neighbourhood when you've got kids out walking" (Carol, 31-35 years, third baby, not working, active)

Safety of footpaths was addressed by participants as an issue that related to both the social and physical environment. Footpaths that were out of sight of the main road were commonly perceived as unsafe as it increased the risk of being robbed or other physical assault:

"...if I go outside like I don't feel it is safe going outside of the estate, because it is like highway and lots of trees and bushes you know I wouldn't feel that safe walking there by myself" (Jaimee, 26-30 years, first baby, working, sufficiently active)

Since not many footpaths were considered unsafe, it did not seem to influence women's physical activity behaviour.

Aspects that participants believed to contribute to neighbourhood safety and positively influence their physical activity behaviour included knowing people in the neighbourhood, no aggressive dogs, a lot of young mothers with prams on the street early in the morning, light traffic, and wide and pram friendly footpaths.

These findings indicate that traffic safety can be a potential determinant of physical activity behaviour during the third trimester when women felt more fragile, and postpartum. In regard to the first and second trimester, traffic safety only appeared to be an important determinant among multigravidas, when walking with a stroller or active outdoors with young children. These findings confirm and extend the existing literature, indicating that traffic-related safety is an important determinant of physical activity during the third trimester of pregnancy and the postnatal phase. Findings add that during the first and second trimester, traffic safety was only an important determinant of physical activity among multigravidas. Findings also add that location of footpaths and vegetation around footpaths can potentially reduce usage of such paths during pregnancy and postpartum.

7.3.5 Weather Conditions

Some women mentioned that blaming the weather as a reason for insufficient physical activity was a poor excuse for not being active. However, these women commonly held a gym membership or went to indoor exercise classes at other facilities. In addition, during the participants' second trimester, the Sunshine Coast experienced exceptional rainfall during its summer, which led to many floods and high humidity. Since outdoor walking was frequently reported as the only activity that was engaged in, participant's physical activity levels were highly affected by the weather:

"I probably slowed down a little bit. I mean you're up here on the Sunshine Coast. So, it has been raining a hell of a lot for a couple of months so we really haven't been able to get out and do a lot of walking" (Carol, 31-35 years, third baby, not working, active)

Previous research also found that unfavourable weather conditions prevented women from being active during pregnancy.^{268, 291} Windy weather was also a concern in the postnatal period. Women were afraid that the baby would catch a cold or get upset. Wind and rain were reported to prevent going for a walk and therefore influenced postpartum physical activity behaviour.

Weather conditions on the Sunshine Coast seem an important determinant of outdoor physical activity during pregnancy and postpartum. These findings therefore confirm and extend the existing literature.

7.4 Chapter Conclusion

This chapter has shown that determinants on an individual, social and physical environmental level can influence women's physical activity behaviour during pregnancy and postpartum. It can also be concluded that since there were more individual and social environmental than physical environmental determinants identified, that physical activity during pregnancy and postpartum is likely to be more of an individual and social issue than a physical environmental issue. Nevertheless, all determinants identified as important need to be addressed in future intervention design in order to achieve optimal leverage for change in women's physical activity behaviour during pregnancy and postpartum. The next chapter discusses the results of the feminist analysis that was used to further analyse the results of this chapter, in order to explore how women give meaning to their physical activity experiences and dominant ideology around physical activity throughout pregnancy and postpartum.

Chapter 8. A Feminist Analysis

8.0 Introduction

This chapter presents the findings from the second stage of analysis based on feminist standpoint theory.^{16, 155, 378, 379} This type of feminist analysis was adopted to further interpret women's experienced physical activity barriers and enablers, identified during the socio-ecological analysis in Chapter 7. This analysis provides an answer to the third research question: How do women give meaning to their physical activity experiences in everyday life throughout pregnancy and the first three postnatal months? Feminist standpoint theory was used to understand the struggles, resistances, compliances, negotiations and transgressions that women experience in relation to dominant ideology (e.g., dominant ideas, attitudes, values, expectations and assumptions) around physical activity, pregnancy and motherhood within the contexts of their everyday lives.

Since the feminist analysis provided an in-depth examination of the social environment, the analysis also contributes to the second research question: How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy and the first three postnatal months?

In addition, the feminist analysis aimed to inform intervention design to ensure future physical activity promoting strategies are sensitive to women's perspectives and lived experiences. This analysis therefore also contributes to the fourth research question: What are the implications for future intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and the first three postnatal months? A comprehensive answer to the second and fourth research question is provided in Chapter 9, sections 9.1 and 9.3.

8.1 Pregnancy, Postpartum and Physical activity

This Sunshine Coast-based study showed that many determinants in the individual, social and physical environment can influence antenatal and postpartum physical activity (see Chapter 7). During the feminist analysis, it was explored how women give meaning to

their physical activity experiences during pregnancy and postpartum and how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood.

Physical activity had multiple meanings for women in this study. These meanings were commonly expressed as tensions. Five key tensions have been identified and are discussed below: 1) Desiring physical activity, keeping the baby safe and social approval, 2) Being a 'good' mother and engaging in self-care, 3) Role fulfilment and physical activity, 4) Struggling and negotiating new identities, and 5) The wish to privately breastfeed yet not be housebound.

8.1.1 Desiring Physical Activity, Keeping the Baby Safe and Social Approval

"Well, I knew I wanted to be active for these benefits (health benefits for me and my baby), but the only thing that concerned me was that I wasn't being as active, that I might put on too much extra weight in that first trimester like more than recommended or whatever if I wasn't active enough, but then on the other hand I thought if I'm too active, I maybe can have a miscarriage or whatever some people say it can cause it" (Jaimee, 26-30 years, first baby, working, active)

"I think if I would have kept up with my exercise a little bit more, it would have helped with my energy levels, but being for the first time pregnant, not knowing anything about being pregnant, I was very cautious, you kind of learn these things as you go along, you don't really want to hurt the baby. I would have kept up my physical activity level a lot more to help with my energy levels if I hadn't been concerned, because physical activity for me actually energises me." (Denise, 26-30 years, first baby, working, insufficiently active)

The data shows that pregnant women often reduced their physical activity behaviour (even if this did not need any change according to the physical activity guidelines) and expressed safety concerns as a reason for this change. There was a fear of 'overdoing' rather than 'underdoing' it. This lack of individual and public knowledge about antenatal physical activity guidelines is a key theme that underpins women's decision-making around antenatal physical activity.

A feminist lens to women's lived experiences in this study also revealed a struggle between desiring physical activity, whilst perceiving a social sanction against it during

pregnancy:

"If I would see pregnant women jogging, I don't know what I would think. I would think oh my gosh what is she doing!....it's a bit of community or social conditioning. It's like when you see a pregnant woman smoking, you think my god, what she's doing is wrong.... I mean, it would probably be a lot different with the second one around if we have another child, I know I probably could have gotten away with that you know....hopefully I'll be a bit more active next time, but I am just, with this pregnancy, I just feel like wrapping myself up in cotton wool, because I don't know what I'm doing wrong or right." (Celeste, 31-35 years, first baby, working, insufficiently active)

The data also shows that this social sanction exists due to the belief that physical activity during pregnancy can cause harm to the unborn baby. One woman even compared the social sanctions against women who jog with those of women who smoke. Women in this study also reported that during pregnancy they were discouraged from physical activity by people at work, the gym and from family and acquaintances. These women were advised to slow down or were challenged that their current activities could be putting their baby's health at risk (See Chapter 7, section 7.2.1.2).

The dominant social norm was to reduce physical activity during pregnancy to low intensity, low impact activities, and to be very careful when engaging in physical activity in order to prevent overexertion and injury. However, the definitions of overexertion, and safe and beneficial physical activity levels during pregnancy were not commonly known:

"I had no idea what I could do" (Linda, 21-25 years, first baby, working, insufficiently active)

Dominant societal values expected pregnant women to reduce their physical activity behaviour to low intensity, low impact activities. Some women conformed to this social expectation, while other women showed resistance or negotiated the meaning of such expectations. Some women showed resistance by ignoring people's expressed concerns because of their perception that such expressions are signs of caring. Other women expressed frustration towards any admonition in relation to physical activity and the resulting special treatment. A common statement from women was: *"I'm not an invalid, I am just pregnant!"*. These women felt frustrated because they felt they were regarded as an irresponsible mother who was engaging in risk-taking behaviour by being active or continuing to work. The workplace and gym were especially places where women felt like they were treated as an infirm or disabled person:

"I guess one big thing that I actually did notice in my last trimester is that a lot of people talk about how you probably shouldn't be working or cut back on work and things like that. I think that that outlook should change. I think it should be changed to something more along the lines of work accordingly to how you feel.....it's not a disability, it's not a disease, having a pregnancy, you can still function and do everything" (Janine, 26-30 years, first baby, working, active)

This comment clearly shows that the participant negotiated a new meaning; whether to continue or cut back certain activities, such as work, should depend on how one feels rather than on set guidelines for all women.

Women also transgressed the social expectation to reduce their physical activity behaviour during pregnancy. These women mentioned that they were active, because they knew it was healthy and because physical activity during pregnancy was supported by their partners and other family members:

"I was active because I knew it was healthy for me and my baby, and my parents would call me and say let's do this or that and my partner was going for walks with me, and verbal support from my parents and partner as well." (Libby, 21-25 years, first baby, not working, active)

Despite advances in health literacy in all sections of the public, and despite the shown resistance and transgression, the notion that pregnancy is a medical ailment^{380, 381} continues to influence and constrain women in this study, and suggests that pregnancy as illness remains a dominant discourse. Previous research also found that pregnant women were either praised for doing 'good work' or were scrutinised and punished for endangering the foetus with immoral or harmful behaviours.³⁸² The findings of Harper and Rail³⁸³ indicate that mother blaming does not start after childbirth, but upon conception. This suggests that not only during motherhood, but also during pregnancy women are restricted in their choices by social expectations of how they should behave. How the concept of 'good mothering' restricts mothers has been well researched^{149, 150, 365-368} and is discussed later in this chapter. However, the scrutiny of pregnant women has not received as much attention.^{382, 383}

The longitudinal study showed that a lack of public knowledge about the antenatal physical activity guidelines and health benefits was associated with hesitance towards engaging in exercise during pregnancy. As a result, active women were more often scrutinised than praised for keeping active during pregnancy. These findings are at odds

with the findings from a recent study in Melbourne¹¹¹ that showed that women were encouraged to embody a 'fit' pregnancy. In this study, Nash¹¹¹ showed that women often felt pushed to constantly engage in a high-level of physical activity in order to maintain an 'appropriately' feminine body (i.e., a body that reveals pregnancy without it being mistaken for fatness) and to prove themselves publicly as capable mothers-to-be. The Sunshine Coast may be an area where information regarding antenatal physical activity is not as accessible to women and the public. However, the difference in sample characteristics could also provide an explanation for this discrepancy as the participants in the Melbourne study were described as career focused women, who were also generally older and had higher levels of education.

The findings in this study suggest that women may have been stigmatised during pregnancy. Stigma has been described as the process by which the reaction of others spoils normal identity.⁴¹ Social stigma in relation to pregnancy is not new. In a study in 1977, it was reported that women felt stared at, avoided and treated differently.³⁸⁴ Recent research also suggests that social stigma and social expectations around the pregnant woman exist, because the pregnant body is perceived as fragile.^{385, 386} The findings in the longitudinal study showed how pregnant women, at times, felt scrutinised and stigmatised in ways that support the notions around the medicalisation of pregnancy.^{184, 380, 381, 387} Although pregnancy is not an illness, it is treated as a medical condition by some obstetricians and nurses, and at times by the public.^{380, 381} According to feminist theorists such as Gentile,¹⁸⁴ pregnancy can embody an ambivalent relationship to an unknown future that causes fear and anxiety. In the age of medical progress, scientific knowledge and medical answers are generally unquestioned as the best and most legitimate solutions, which explains why society turns to the medical world to eliminate or reduce such anxiety.¹⁸⁷ Previous research has also shown that the medicalisation of pregnancy resulted in the contemporary centrality of risk prevention that extends well beyond encounters with health care providers, which restrict women's agency.³⁸⁸ These insights offer potential explanations why some women were scrutinised and stigmatised during pregnancy and how this appeared to have reduced their physical activity behaviour during pregnancy.

8.1.1.1 Acceptance of and Resistance towards physical activity recommendations

This study showed that although women considered it to be feasible to meet the physical activity recommendation during pregnancy and postpartum, this recommendation was not commonly met. Women, who did meet the physical activity recommendation, commonly reported remaining active because they enjoyed it and because they were aware of the related benefits for their personal health and the health of their baby:

"I enjoyed being active before pregnancy and I still enjoy it during pregnancy and I also think it's important for my health and the baby's health" (Libby, 21-25 years, first baby, not working, active)

Women who did not meet the physical activity recommendations reported several struggles, which have been described earlier in section 8.1.1 and are also discussed in sections 8.1.2 and 8.1.3. However, some women showed conscious resistance towards meeting the physical activity recommendation. These women did not wish to follow any guidelines in relation to physical activity because they considered themselves as "healthy enough" or engaged in amounts of physical activity they perceived as sufficient:

"I think I could do that [meeting the physical activity recommendation] if I wanted to, but I think I probably will be somewhat just a little bit under that, but that's enough for me..." (Cynthia, 31-35, third baby, not working, insufficiently active)

"I've never been one to overexert myself, just whatever happens happens...I wish to continue walking and swimming not from an exercise point of view, just to have something to do..... [in the future] I think I'll just be not sort of making the effort, if it happens it happens sort of thing." (Julie, 21-25, first baby, not working, insufficiently active)

This data shows women negotiating their own meaning for physical activity. For most mothers, exercise was not just about keeping their body in shape. Especially in the postpartum phase, it was mostly about keeping themselves mentally healthy.^{112, 246, 285} The intensity of their exercise was not their main concern; it was more about getting out of the house:

"...I probably do not meet the intensity part of the recommendation. I want to get fit and get my body back, but it's more about like it [physical activity] helps you with postnatal depression when you get out and walk, that's why I tried to get out of the house everyday in the beginning...otherwise I'd go insane... it gives you a clear mind and keeps you refreshed just getting outside and doing a bit of exercise...just keeping sane for my sake and for her sake." (Linda, 21-25, first baby, not working, started exercising after 3 months postpartum when she got her doctor's approval)

Some participants mentioned that they chose not to follow their doctor's advice to continue exercising, because they were concerned about having a miscarriage, while others questioned their doctor's expertise in relation to antenatal physical activity:

"I've had friends who had miscarriages and stuff, so it didn't really matter what the doctor said, I was too paranoid." (Eva, 21-25 years, first baby, working, insufficiently active)

"most GPs are not specialised in it and therefore don't have a set answer for you, so it's just an opinion." (Linda, 21-25 years, first baby, working, insufficiently active)

Women also mentioned that although they considered the antenatal physical activity guidelines to be helpful in understanding what is good for their health during pregnancy, they did not let these messages take preference over the signals their own body was giving them. They trusted their own body more than the guidelines and showed resistance towards being told what to do:

"with this pregnancy I have read things in books and stuff so I know little bit more now [about the physical activity guidelines]...but I think you know when your body is exerted so then you stop, you just have to listen to your own body....so that's the answer to that one" (Carol, 31-35 years, third baby, not working, active)

Previous research also showed that some pregnant women showed resistance towards medical advice and questioned the correctness of current health guidelines.³⁸⁹ This resistance towards and negotiation of the social expectation to follow expert advice shows that women have the potential to reach a level of agency that can assist with increasing physical activity. The findings in this study agree with Harper and Rail;³⁸³ physical activity as a health practice during pregnancy is constructed as something intimately connected with their baby's health, as something that requires an active search for expert knowledge and appraisal, and as a personal feeling that is influenced by personal values and embodied experiences.

8.1.2 Being a 'Good' Mother and Engaging in Self-care

"...[Physical activity,] it wasn't the biggest priority. The small baby first, then the second baby, then the housework, then the exercise." (Gabriel, 31-35 years, second baby, not working, insufficiently active)

"It [physical activity] should have been really important, but I didn't think about myself at all. I was just really focused on the baby." (Eva, 21-25 years, first baby not working, insufficiently active)

The data shows that women had commonly internalised a prevailing ethic that motherhood involves putting one's own needs last, and how this can encumber physical activity. Comparing this study and other recent studies^{149, 150} with past motherhood literature³⁶⁵⁻³⁶⁸ suggests that the social definition of a 'good' mother, that is to put the self last, continues. The findings in this study also confirm the findings in other studies,^{112, 247, 249, 252, 254, 256, 264, 279, 284, 290} indicating that dominant societal perspectives on how a 'good' mother should behave encumber physical activity. Feminist theorists^{144, 367, 390} have explained that such restricted definitions of the 'good' mother cause women to question the justice of taking time out for self-care, which problematises physical activity.

However, some women in this study transgressed the dominant assumption that to be a 'good' mother, one's own needs should be disregarded:

"...if my health suffers then he's going to suffer, because of the fact that if my health suffers I can't play with him and I can't feed him properly if my health's not right really, so getting out and about, interacting and trying to keep active and keep your mind active as well, those things are important" (Jaclyn, 36-40 years, second baby, not working, insufficiently active)

"...we want him to grow up being active, so we both want to make sure that we're very active...my husband would go crazy if he couldn't be active...we went up Mt Coolum with him at six weeks old.... we did get some funny looks from people, but no it was very important that we could be doing those sorts of things that we like doing." (Lisa, 31-35 years, first baby, not working, active)

Women who were sufficiently active tended to be more aware of how physical activity can improve personal and family wellbeing and how to achieve a balanced lifestyle compared to insufficiently active women. Lewis and Ridge¹¹² also acknowledged that for some women physical activity helped with being a good mother. They found that more active women tended to describe leisure-time physical activity as: a 'time-out' that generates pleasure and release; something that helps with being a 'good' mother and an active role model and helps with better parenting; good for personal and therefore family health; a 'worth it' trade-off with their domestic role.¹¹² Less active women tended to describe leisure-time physical activity as selfish time that requires effort and takes time away from responsibilities such as childrearing and domestic chores, and therefore as something that competed with how a 'good' mother should behave.¹¹² This appreciation that it is possible to care for baby and care for self indicates the possibility for new mothers to

negotiate new meaning and reach a level of agency that can assist with increasing physical activity.

8.1.3 Role fulfilment and Physical activity

“After having bubs it was just basically time and if I had had no sleep at all then that kind of made it difficult [to engage in leisure-time physical activity], especially if the other one was waking up as well...you’d be running backwards and forwards without any sleep at all.....I’m also doing more work with the businesses that we’ve got because that’s busier so, yeah, I’ve just been busier just running around and chasing kids and working....so when the kids are asleep, I’m just going to lay down.” (Jaclyn, 36-40 years, second baby, insufficiently active)

Women in this study struggled to find the time to fully complete their daily chores within the roles they fulfilled. This social role strain was created by gender role expectations around what constitutes a ‘good’ mother, and was experienced as an important barrier to physical activity. Although housework includes physical activity, women who mentioned housework as the main activity tended to be less likely to meet the physical activity recommendation.

Another challenge for women in this study was the struggle for equality in the household:

“My hubby, he’s not the domestic type....he’s not that way inclined I’m afraid....My husband – not that I ever want him to hear but – he’s not that supportive as far as saying oh look I’ll look after Jessie while you do your treadmill. He doesn’t, he won’t, he can’t, like they fight and they clash....I’m doing things because a housewife has to maintain the house and I’ve got a little one to look after. Someone’s got to do it” (Gabriel, 31-35 years, second baby, not working, insufficiently active)

“If I said to them I need more help around the house they’d be there for me. It’s because I am pretty independent and I was actually pushing them away in the first couple of weeks saying, no, I can do this. I can have a baby and do this.....and I’m not providing financially for my family anymore so....” (Celeste, 31-35 years, first baby, not working, active)

Data shows that some women had internalised the social norm that stay-at-home mothers need to fulfil all domestic and childrearing tasks by themselves in order to be a ‘good’ mother and wife. This shows how dominant societal expectations and values shape women’s behaviour and how women themselves maintain such values, which restrict their freedom of choice and engagement in physical activity. This data also demonstrates that leaving the paid workforce can result in the belief that unpaid chores should now rest

on their shoulders to compensate for the lack of financial contribution. This finding echoes the point made by Weeks:¹⁵⁸ the closer women's work activities come to nurturing, comforting, or encouraging, the less women's efforts are seen as work. Weeks¹⁵⁸ also argued that because of such societal attitudes, stay-at-home mothers could experience a lack of social validation, which can impede women's development and functioning.

The findings in this study confirm those of other studies which found that women struggle to balance roles of motherhood and/or career with physical activity and other types of self-care.^{93, 112, 244, 250, 253, 254, 277, 278, 284, 297, 391} In today's Australian society, but also in the past, working class women have combined children, housework, marriage and work.³⁹¹ In contrast to any idealised notion of motherhood, women in this study saw themselves as 'doing it all' rather than 'having it all'. For these women, fulfilling all roles and also finding time to exercise was a continuous struggle. Findings in this study support the findings of previous studies;^{93, 112, 238, 244, 247, 250, 253, 254, 264, 277, 278, 284, 297} social role strain based on gender role expectations can encumber the prioritisation of time for self and therefore physical activity. These findings again illustrate how the 'good' mother identity is socially constructed in ways that set expectations in terms of what roles women should fulfil to be considered 'good', which in turn restricts women's freedom to engage in physical activity.

However, some women in this study transgressed the dominant societal expectation that a 'good' mother should 'do it all'. These mothers engaged in leisure-time physical activity in order to reduce the social role strain:

"...[Physical activity is important] also for the stress levels, to be able to clear your head and just get away from everything..." (Lorinda, 26-30 years, third baby, not working, active)

Although this negotiated practice also occurred at times without support, some women mentioned *"I could not have done it without the support of my partner and family"*. This addresses the potential importance of partner support, or significant others in the absence of a partner. In addition, whether women were appropriately active for health benefits also depended on how they constructed their identity as mothers(-to-be).

8.1.4 Struggling and Negotiating New Identities

As described in Chapter 6, section 6.1.4, many first-time mothers described new motherhood as a joyful time, while at the same time experiencing struggles related to their new mother identity. There was an apparent ambivalence towards the identity change in this study. Women spoke about motherhood and the related identity change as something that was loved as well as feared:

"I am trying to enjoy being off on maternity leave and being with my baby, and I do really enjoy it, but I still sort of worry...I don't want to let my career go because I've worked so hard to get it and it is on hold at the moment. I mean....I'd give it up for her any day of the week in a heartbeat....but I'm probably going to go back to work early....just a couple of days a week" (Celeste, 31-35 years, first baby, not working, active)

Here lies an important paradox; the birth of a child brought joy to mothers, yet having to conform to social expectations of how a 'good' mother should behave also brought fear. These social expectations in relation to maternal role fulfilment generated a paradox between the joy of having a new baby and the shock or grief from losing a pre-pregnancy identity. Also inherent in this data is the expression of guilt for wanting to be more than a stay-at-home mother. According to Allan,³⁹² when a woman perceives herself as not having achieved the standard of what it means to be a good mother, regardless of how the role is defined, it is likely to result in feelings of guilt, blame, shame, and marginalisation. The fear of becoming a mother due to the restriction that comes with this title is also inherent in this data. As was also noted by Gorman and Fritzsche,³⁹³ women in this study often perceived a 'good' mother as someone who remains at home and makes the development of her children her primary focus. This restrictive definition of maternal identity was commonly feared. First-time mothers in this study explained what this identity struggle meant for them:

"[My life,]...it's not mine anymore, it's hers. Everything has changed. It just revolves around her now, basically. Like I said, I can't just get in the car and go to the shops or go to the gym or whatever. I have to lug a pile of shit around with me, and it's not just like a two second thing, you have to consider how she'll be doing whatever you're wanting to do and what stuff you've got to take with you, and how long you can be out for before she'll need a feed..."(Jaimee, 26-30 years, first baby, not working, active)

"I've become a housewife which is slightly traumatic for me....I think I've only had one meltdown I think, that was about week 15....it was the realisation that my life was not going to be what it was...Love being a mother, but coming from having a focused career, it was not going to be that anymore...and just the effect on my brain...I forgot

things and it just became a bit like oh my god if I can't remember such basic simple things, how am I ever going to be able to work again type thing." (Lisa, 31-35 years, first baby, not working, active)

"I had a few days where I have a bit of a teary...the whole breastfeeding thing wasn't going too well, and just how it's such an insane life change, and you never realise how much it changes your life until you actually have the baby. I was totally delusional...in the first couple of weeks, when you're getting used to it, it's just so overwhelming, and you have thoughts of am I doing everything right? Am I an all right mum?...and the way I look, yeah it does worry me and it makes me feel a bit yucky, and it does make me have a bit less confidence, definitely, and makes me think does my boyfriend still love me?" (Jaimee, 26-30 years, first baby, not working, active)

This data shows that some women experienced the transition from work role to homemaker as traumatic, while others felt dispossessed and/or had a crisis of confidence. It also shows feelings of loss in relation to their perceived control over their life and pre-pregnancy figure, and their independence and freedom due to having to consider another person who fully depends on them for survival.

In relation to work changes, Ladge et al³⁹⁴ explained that first pregnancy sets in motion multiple feelings of uncertainty in relation to identity: who they are becoming as their pregnancy progresses, who they will become after childbirth and how this (emerging) maternal identity will affect their existing role and identity as professionals. The findings in this longitudinal study show that such uncertainty was more commonly expressed after rather than before childbirth. The findings in this study also showed that these uncertainties became even more evident when women decided to become a stay-at-home-mother. Coming from a work life, new mothers struggled to find meaning in their identity as a mother and full time home maker:

"I don't actually miss the work...I could probably not work for the rest of my life but I don't want to just be a full time house duty mother....I miss the intellectual or adult stimulation and I do want to keep my career going if I can and provide for my family obviously." (Celeste, 31-35 years, first baby, not working, active)

These women commonly viewed childcare and domestic chores as not having any financial value, which reduced their sense of self-worth. This made it hard for some women to accept the identity change from employee to home maker, even if it was only for a short time. This notion again echoes the point made by Weeks:¹⁵⁸ the closer women's work activities come to nurturing, the less women's efforts are seen as work, leading to a potential lack of social validation, which can impede women's development and functioning.

Women in this study also expressed shock about the unexpected changes, finding it surprising and disappointing that they were not prepared during pregnancy for what was ahead. Common expressions were “no one told me how hard motherhood is” and “no one told me breastfeeding would be so hard”. These women explained that although friends had told them about a few challenges such as dealing with sleep deprivation, motherhood was mostly described as something wonderful. Such findings have also been reported elsewhere. Maushart, for example, referred to this as “the mask of motherhood”.³⁶⁴ She described the process of becoming a mother as something that changes women’s lives completely and explains why women never talk about it. According to Maushart, today’s mother feels more pressure than ever before to defend her choices by ‘putting on a happy face’.³⁶⁴ However, it can also be argued that some mothers do not wish to share all of their lived experiences with new mothers-to-be, because they do not wish to cause panic. These mothers may acknowledge that although motherhood can be experienced by women in similar ways, it is also an individual experience as not all women experience struggles such as sleep deprivation, identity crisis, and physical discomforts related to a caesarean section and/or breastfeeding difficulties.

Feelings of loss of identity, control, figure and attractiveness combined with a lack of sleep, feeling emotionally overwhelmed, struggling with breastfeeding, consoling their baby, and finding a routine with their baby, were for many too much to handle initially. The demands of new motherhood also induced a lot of stress, which for many mothers encumbered both physical activity as well as a healthy diet:

“It is, I mean I found it difficult initially to get out of the house. It was so stressful to get out of the house, stuff you had to do; you had to feed her first and you know make sure she was all done and ready and fed just to get out of the house for an hour....you know she would scream and I just didn't want to put myself or her in that situation, so I wouldn't leave the house. It was just too stressful...we tried to make it [our health] a priority and at times we did and at times we didn't, because at times it was stressful and she was screaming, it was just ahhhh let's just have beans on toast” (Jessica, 36-40 years, first baby, not working, insufficiently active)

The experience of stress as a result of new motherhood had an impact on women’s lives. Women commonly mentioned high stress levels – due to feeling lost in terms of meeting all the demands of motherhood – to encumber postpartum physical activity. Life changes, such as becoming a mother for the first time (including dealing with infant crying), can cause a lot of stress, which can lead to psychological decompensation.^{13, 356, 357} Feminist

scholars (e.g., Brown et al³⁶⁷ and Phoenix et al¹⁸²) have argued that the 'good' mother ideology reinforces the notion that a mother who is not coping is abnormal or unnatural, which can have serious consequences for the emotional wellbeing of women. The findings in this study support Seel's³⁵⁴ findings that upon discharge from the hospital, new mothers commonly expressed feeling overwhelmed in terms of how to fulfil all the demands of motherhood. Upon childbirth, the focus tended to be on the baby. Mothers commonly expressed feeling relatively overlooked:³⁵⁴

"It wouldn't hurt [to get more information on self-care], like you do get a lot of information when you leave the hospital, but it's all related to the baby." (Molly, 41+, first baby, working, insufficiently active)

Women in this study also demonstrated at times an either/or thinking approach to their challenges. For example, one woman said: *"I can only fulfil my needs or my baby's needs"*. Another said: *"I can either have a career or be a good mother"*. Women in this study, particularly first-time mothers, were struggling to believe they could fulfil their own needs while being a good mother. Multiparous women did not experience the same crisis in beliefs, but they still expressed struggling with finding time for physical activity. However, some women in this study transgressed the dominant ideology regarding how pregnant women and mothers should behave by negotiating a new stance. Active women commented that being active was part of their pre-pregnancy identity and they did not want to give this up upon motherhood:

"...[I engage in leisure-time activities,]because I would seriously go insane if I couldn't be physically active with him...and just to make me feel you know that I wasn't, and this might sound really bad, that I wasn't bound by being a mother. Does that make sense, if you know what I mean? That it wasn't going to restrict who I was previously." (Lisa, 31-35 years, first baby, not working, active)

This notion of not wanting to lose a part of one's identity was also identified in previous research. These studies found that women continued to be active upon pregnancy, because they did not want to give up who they were pre-pregnancy.^{105, 265, 269} Lewis and Ridge,¹¹² also found a 'new' maternal identity that does not require a reduction or elimination of leisure-time physical activity. Engagement in physical activity was essential within this 'new' maternal identity as it helped with being a 'good mother', by providing physical health, stress relief, more energy, and the chance to create an active, healthy family environment. This acknowledgement that it is possible to become pregnant and be a mother without having to entirely give up one's pre-pregnancy identity, indicates the

possibility for new mothers to reach a level of agency that transgresses the restrictive definition of the 'good' mother identity. In addition, these lived experiences of the transition to motherhood and how women in this study gave meaning to their experiences, show mother(-to-be) identities to be evolving, context-sensitive sets of self-constructions derived from socially constructed meanings in particular situations.³⁹⁵⁻³⁹⁷

8.1.5 The Wish to privately Breastfeed yet not be Housebound

"...I do the demand feeding, so you find at first it feels like every half an hour you've got to feed the baby, and that can make it seem like how am I ever going to get anything done? I haven't really been out that much but I do notice when I'm looking out the front windows quite a lot of people that exercise around here, and it makes me think I've got to get outside doing that and start saying hello to people and stuff." (Mary, 41+ years, first baby, not working, insufficiently active)

The data shows that breastfeeding was experienced as a time consuming activity during the first three postnatal months, leaving less opportunity for physical activity. Health messages promote women to be active as well as breastfeed³⁹⁸⁻⁴⁰¹ after childbirth, yet the findings in this study showed a tension between these two actions.

During the first three postnatal months, breastfeeding was also commonly perceived as a performance of mothering that needed to be done at home, especially among first-time mothers. Women expressed feeling trapped inside the house, which encumbered physical activity:

"It is [hard to be active in the postnatal phase], I mean I found it difficult initially to get out of the house. It was so stressful to get out of the house, stuff you had to use and you had to feed her first and you know make sure she was all done and ready and fed just to get out of the house for an hour, because then she needed to be fed again." (Jessica, 36-40 years, first baby, not working, insufficiently active)

This data shows that home-based breastfeeding was not only reported to reduce leisure-time physical activity, but also incidental physical activity. Women who were walking to the shops, library or school to pick up their children during pregnancy, often mentioned they took the car in the postnatal phase to be back home in time to breastfeed.

There were two main reasons why mothers breastfed at home: 1) breastfeeding in public was perceived as stressful and 2) mothers did not want other people to see their breasts.

Breastfeeding in public was commonly perceived as too uncomfortable and stressful, especially for primiparous mothers and mothers who were struggling with breastfeeding:

“Oh my goodness, it’s a bit crazy. It sort of, I don’t know, I struggled a lot. I had a lot of feeding problems, so for the first six weeks, just one big blur of trying to feed him.” (Eva, 21-25 years, first baby, not working, insufficiently active)

“Once you leave the house, that routine kind of breaks and she would get really upset and frustrated...you know she would scream... It was just too stressful to sort of feed her out in public...I do do that now [after 3 months], I’m much better with that now, but initially, I was not...” (Jessica, 36-40 years, first baby, not working, insufficiently active)

Inherent in this data is the wish to meet the baby’s needs but also a sense of embarrassment for breaking a social code of propriety. Women described an apparent dominant social norm; if a baby starts to cry, the parents should take the baby home. This is why one of the mothers was so happy that the local cinema now had special session times for parents with babies, because if her baby would cry she no longer was ‘forced’ to leave:

“Sunshine Plaza at the cinema, they do a “babes in arms” it’s called, so for parents with babies, and so lights are dimmed but you can obviously have noisy crying babies there, once they turn the sound down a bit and so it’s especially for parents with young babies.... so when we heard about it, we’re like that sounds cool” (Lisa, 31-35 years, first baby, not working, active)

The dominant social norm was that breastfeeding should be done in private away from the eyes of others, which participants commonly accepted without questioning. Some women spoke of embarrassment towards having their breasts exposed in public or when visitors would unexpectedly walk into the house. They mentioned feeling embarrassed if they ‘got caught’ breastfeeding. One woman voiced this very clearly as people walked in during the telephone interview while she was breastfeeding:

“...and if he’s got a dirty nappy there was always another hand available to – sorry there’s just some people coming in I’ve just got to put my boob away hang on a sec, that’s better my brother has turned up with his mates so I don’t want to be sitting here with a boob hanging out – Yeah so I was lucky I did have a lot of support both physical and emotional as much as I needed it.” (Mary, 41+ years, first baby not working, insufficiently active)

These findings echo the point made by Pain et al⁴⁰² relating to concerns about bodily exposure and the sense that to breastfeed outside the home is to risk transgressing a social norm. According to feminist researchers,⁴⁰³ public breastfeeding is associated with notions of ‘good mothering’ and also presents an important paradox: while breastfeeding

is often posed as an expression of 'good' mothering, it is also a performance of motherhood that must be, paradoxically, carried out away from the eyes of the public. Breastfeeding is often perceived as natural or unnatural, and as sacred or profane.⁴⁰³ Public breastfeeding therefore offers the opportunity to interrogate social binaries and re-evaluate how these direct the performance(s) of our private and public behaviour, including physical activity. No resistance, transgression or further negotiations were reported in relation to public breastfeeding norms. However, this could be explained by the fact that there was no direct inquiry regarding breastfeeding practices and experiences.

Previous research has shown that in Western cultures, people often frown upon women breastfeeding in public.⁴⁰⁴ There have been many incidents reported where women were reprimanded for breastfeeding in public,^{403, 405} even in the waiting room of an obstetrician's or gynaecologist's office.⁴⁰⁶ Recently on Bribie Island (one hour from the Sunshine Coast where this study was conducted), there was a demonstration at a public pool following the ejection of a mother who was breastfeeding.⁴⁰⁷ Sociologists have stated that the social and sexual significance of the female breast rivals, if not exceeds, its biological significance.⁴⁰⁸ A recent study conducted in three US cities found that men acknowledged the contradiction between public exposure of breasts in a sexual context versus public exposure for breastfeeding.⁴⁰⁹ Forbes, Adams-Curtis, Hamm, and White⁴⁰⁴ found erotophobia to be a key factor associated with more negative perceptions of the breastfeeding compared to a bottle feeding mother. In addition, the extent of an individual's exposure to breastfeeding in general⁴¹⁰⁻⁴¹² and in public settings^{411, 413} in particular appears to be associated with more positive attitudes towards breastfeeding and increased intention to breastfeed their own children.^{411, 414-416} Acker,⁴¹⁷ who focused on a wide range of ages and factors contributing to negative views towards public breastfeeding, found that men had more negative views than women and younger women had more negative views compared to older women. Negative views were associated with low levels of exposure to breastfeeding women, sexist attitudes, and the hyper-sexualisation of the breast.⁴¹⁷ However, a study in Western Australia (which was the only Australian study that could be identified in the published, peer-reviewed literature) found that people older than 44 years, those born outside Australia (i.e., England, Ireland, Scotland, Wales, and other countries that were however left undefined), and the less

educated were those more likely to view public breastfeeding as unacceptable.⁴¹⁸ Interestingly, the study also found that women were more likely than men to view breastfeeding in public as improper.⁴¹⁸

In summary, this study showed a tension between home-based breastfeeding and physical activity. In the first three months postpartum, breastfeeding was often perceived as a time consuming and, at times, stressful experience (e.g., when the baby did not attach to the breast properly). Privacy was key; breastfeeding in public under the scrutiny of others was commonly perceived as embarrassing and stressful, which made it less likely for women to go outside and engage in physical activity. A lack of consistent and positive views towards breastfeeding in public also appeared to have influenced women's physical activity behaviour outside the domestic space. The literature previously discussed indicates that bodily exposure appears to be the key trigger for negative attitudes towards public breastfeeding.

However, women's perspectives on public breastfeeding were not explicitly investigated. More research is therefore required in order to find out how Sunshine Coast mothers perceive public breastfeeding, how they feel perceived by others and how this is associated with their physical activity behaviour.

8.2 Discussion

In alignment with feminist standpoint epistemology, the aims of the feminist analysis (see Chapter 3, section 3.4.7.2) were to: 1) reveal hidden and unrecognised research areas, 2) identify how women may conform to, resist, transgress or renegotiate mainstream messages in society, 3) identify women's demonstrations of double consciousness, 4) identify the close interplay between social and biological factors (e.g., the interplay between sex, gender and social expectations), 5) understand how women's knowledge is socially situated, and 6) inform future intervention design in ways to increase agency among marginalised groups, leading to empowerment and social change.

This chapter revealed two hidden and unrecognised areas of research. Firstly, the social stigmatisation of pregnancy was identified as an unrecognised research area in relation to

antenatal physical activity. No published, peer-reviewed studies have been located in the reviewed literature that investigated this association between social stigma and antenatal physical activity. Secondly, public breastfeeding was acknowledged to be an unrecognised research area in relation to postpartum physical activity. Although breastfeeding has received a reasonable amount of attention,⁴¹⁹⁻⁴²⁸ public breastfeeding studies within Australia are limited.⁴¹⁸ In addition, no published, peer-reviewed study could be located in the reviewed literature that investigated or discussed the association between public breastfeeding and postnatal physical activity.

This chapter identified how women may conform to, resist, transgress or negotiate mainstream messages in society. Resistance, transgression and negotiation took place in several areas: 1) Social expectations around physical activity (e.g., some women resisted the social expectation to reduce physical activity levels by continuing pre-pregnancy activity levels), 2) The 'good mother' identity (e.g., some women transgressed the dominant ideology around this concept by not letting go of the active person they were pre-pregnancy), 3) The practice of 'good mothering' (e.g., some women negotiated a new meaning: physical activity and other types of self-care help with being a 'good' mother), 4) Public breastfeeding (e.g., some women transgressed the dominant ideology around public breastfeeding by breastfeeding in public).

Women's lived experiences related to conforming to, resisting, negotiating or transgressing dominant ideology demonstrates double consciousness. Women explained how their own perceptions and the dominant perceptions in society caused tensions in relation to their physical activity behaviour: 1) desire to engage in physical activity while keeping the baby safe and enjoying social approval, 2) wanting to be a 'good' mother and engage in sufficient physical activity for health benefits, 3) wanting a mother identity without losing their pre-pregnancy identity that included leisure-time physical activity, 4) wishing to privately breastfeed yet not be housebound. In relation to the desire to enjoy social approval, women responded in various ways: some women showed compliance towards the social expectation to reduce physical activity to a low intensity; some women showed resistance by exercising as much as they used to pre-pregnancy; and others showed negotiation by finding a balance (e.g., changing the type of activity yet

maintaining a moderate intensity). Such processes also took place in relation to being a 'good' mother, fulfilling daily chores, identity struggles and public breastfeeding.

This chapter also demonstrated the interplay between biological and social factors. Such interplay was found in the biological state of pregnancy and social stigma; being a woman and related social role expectations; the natural act of feeding a baby; and social perceptions of breastfeeding (in public).

This chapter also revealed how women's knowledge is socially situated. Women's perspectives and therefore their knowledge were influenced by the values they grew up with, their experiences, their social network and social support. Although women within the longitudinal study had similar perspectives based on the shared experience of pregnancy and motherhood, they also held different perspectives related to individual experiences within different social networks and physical environments. Physical activity had multiple meanings: it was perceived as both enhancing and threatening their health at times, as something that competed with and helped with being a 'good' mother(-to-be), and as something that could restrict or expand their identity as mothers(-to-be). Physical activity was also described as something that was part of and competed with the fulfilment of daily responsibilities in terms of domestic chores and childrearing, and as something that competed with home-based breastfeeding. The findings also showed how such meaning constructions can differ from woman to woman and how these could change over the course of pregnancy and motherhood. It is therefore acknowledged that, since personal, social and physical circumstances (e.g., mood, social support, physical location) change over time, the findings in this study only provide ideas of what women may experience and why. The findings are not typical for all women nor were the reported experiences continuous. If women were interviewed on different days, they may have highlighted different things depending on the circumstances.

This chapter has also provided insight on ways in which pregnancy and motherhood offer opportunities for increasing agency, empowerment and social change, which can increase women's physical activity levels during pregnancy and motherhood. Intervention suggestions based on the insights provided in this chapter are discussed in Chapter 9, sections 9.2 and 9.3.

8.3 Chapter Conclusion

In relation to the second research question (How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy until 3 months postnatal?), the feminist analysis provided support for the following determinants as important in relation to their influence on women's physical activity behaviour during pregnancy: 1) knowledge, 2) behavioural beliefs, 3) identity struggles, 3) self-worth, 4) priority, 5) gender role expectations, 6) social role strain, 7) instrumental support, 8) informational support, and 9) social stigma attached to pregnancy. However, self-worth, gender role expectations, and social role strain were only important determinants of antenatal physical activity among multigravidas. In relation to the postnatal period, the following physical activity determinants were important among both multiparous and primiparous mothers: 1) knowledge, 2) behavioural beliefs, 3) self-worth, 4) priority, 5) gender role expectations, 6) social role strain, 7) instrumental support, 8) informational support, and 9) social norms related to physical activity and public breastfeeding.

In relation to the third research question (How do women give meaning to their physical activity experiences in everyday life throughout pregnancy and the first three postnatal months?), it can be concluded that women's physical activity practices are the outcome of a complex process of negotiation between: 1) Desiring physical activity, keeping the baby safe and social approval, 2) Being a 'good' mother and engaging in self-care, 3) Role fulfilment and physical activity, 4) Struggling and negotiating new identities, and 5) The wish to privately breastfeed yet not be housebound. These tensions show that physical activity had multiple meanings for women in this study. Physical activity was perceived as both enhancing and threatening their health at times, as something that competed with and helped with being a 'good mother', and as something that could restrict or expand their identity as mothers(-to-be). Physical activity was also described as something that was part of and competed with the fulfilment of daily responsibilities in terms domestic chores and childrearing, and as something that competed with home-based breastfeeding.

In this study, stigmatisation of pregnant women due to a lack of individual and public knowledge regarding antenatal physical activity guidelines and benefits was associated with pregnant women's physical activity behaviour. For women in this study, motherhood

came with many challenges; social expectations around how a 'good' mother should behave and what roles she should fulfil,^{112, 238, 244, 250, 257, 264} and dealing with identity change and negative views towards breastfeeding in public.^{404, 410-417} This study also showed that pregnancy and motherhood offer opportunities for resistance, negotiation and transgression of such dominant ideology that can lead to improved physical activity behaviour and overall wellbeing among women.

Chapter 9. Implications for intervention design

9.0 Introduction

This chapter triangulates the findings from each analytical method to recognise consistent determinants across methods and stage (i.e., 1st, 2nd, 3rd trimester and postpartum), and to identify differences and variability in order to answer the second research question: How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy and the first three postnatal months? The answer to the second research question provided the input for the fourth research question "What are the implications for future intervention design in order to promote and sustain appropriate physical activity throughout pregnancy and the first three postnatal months?".

It is important to develop effective Public Health interventions or programs to increase physical activity levels among pregnant and postnatal women as such increases can improve physical health of mother and infant and improve mental wellbeing during pregnancy and postpartum (see Chapter 1, section 1.3 for evidence). Compromised maternal psychological wellbeing such as depression has been associated with reduced paternal psychological wellbeing and family and child functioning.⁵¹ Therefore, promoting physical activity among postnatal and multigravidas also holds the potential to improve overall family wellbeing. The next section describes the determinant analysis that consisted of a triangulation of methods: literature review, intervention review and longitudinal study.

9.1 Determinants Analysis using Triangulation

As described in Chapter 3, section 3.5, methodological triangulation of three different data collection methods were chosen in order to improve validity, reliability and to ensure a comprehensive understanding of the determinants of physical activity during pregnancy and postpartum, and how these differ from the general population and from women in

different life phases. Table 9.1 provides an overview of this comprehensive determinant analysis and shows the contribution of each data collection method.

Table 9.1 *Triangulation results: comprehensive determinant analysis*

	Determinants	Literature Review	Intervention Review	Longitudinal Study
Individual	Overall attitude	?		NS
	Behavioural beliefs	p,4,n&m	4,n&m	1,2,3,4
	Intention	2,3,n&m	4?,n&m?	2?
	Knowledge	p,4?,n&m?	p?,4?	1,2,3,4
	Motivation	p,4,n&m	p?,4?,n&m	1,2,3,4
	Self-efficacy: barrier self efficacy and self-regulatory efficacy	1,2?,3?,4,n&m?	p?,4?,n&m	1,2,3,4
	Sickness	p		1
	Physical discomfort	p		3,4
	Tiredness	p,4,n&m		1,3,4
	Priority	p?,4,n&m		1,2,3,4
	Identity struggles			4
	Self-esteem & body image	3?,n&m	w?	NS
<i>Self-worth</i>		w?	1*,2*,3*,4	
Social environmental	Social networks and social interaction	p?,4?,w?	p?,4?,n&m?	1 ^a ,2 ^a ,3 ^a ,4 ^a
	Social support:			
	<i>Emotional & instrumental support from partner, family & friends</i>	p,4,n&m	p?,4?,n&m	1,2,3,4
	<i>Support at work</i>	w	w?	2,3
	<i>Informational support</i>	p,4	p?,4?	1,2,3,4
	<i>Instrumental support from health professionals: postnatal contact</i>			4
	<i>Instrumental support: exercise DVD's</i>	NS	4?,m?	NS
	<i>PA companionship</i>	p,4,n&m	p?,4?,n&m?	1,2,3,4
	Social norm related to public breastfeeding			4
	Social inequality:			
	<i>Income inequality</i>	p?,4?,n&m		NS
	<i>Costs of PA and childcare facilities</i>	p?,4?,n&m		1,2,3
	<i>Education and work inequality</i>	?		NS
	<i>Racial inequality</i>	?		NS
	<i>Gender inequality:</i>			
	<i>Social norm in relation to PA</i>	p,4,n&m		1,2,3,4
	<i>Social stigma attached to pregnancy</i>			1,2,3
<i>Gender role expectations</i>	m		1*,2*,3*,4	
<i>Lack of time</i>	p,4,n&m		1,2,3,4	
<i>Social role strain</i>	p*?,4?,m		1*,2*,3*,4	

	Neighbourhood Safety: Perceived crime	?		NS
	Social cohesion & social capital	w&m?	w?	p?,4
Physical environmental	Aesthetics	p?,w&m		1,2,3,4
	Neighbourhood walkability	p?,4?,w&m		1,2,3,4
	<i>Proximity to facilities such as shops, cafés and library</i>	w&m		1*,2*,3,4
	Availability of PA facilities	p?,4?,w&m		1,2,3
	Home PA equipment	NS		NS
	Transport	p?,4?,w&m		?
	Neighbourhood Safety	?		1*,2*,3,4
	Weather conditions	p,4?,w&m		1,2,3,4

*p= pregnancy, m= mothers, n= nulliparous women, w= women, 1= 1st trimester, 2= 2nd Trimester, 3= 3rd trimester, 4= postnatal, PA= physical activity, ^a= only important in combination with companionship, ?= unclear, * = only important among multigravidas, # = only important among first-time mothers*

Based on the findings from these three studies or data sources, it can be concluded that the following determinants appear to be important and consistent determinants of physical activity throughout pregnancy and the first three postnatal months: behavioural beliefs, knowledge, motivation, self-efficacy, emotional support, instrumental support, informational support, and companionship, and social networks and social interaction. However, findings suggest that the presence of social networks and social interaction may only be important facilitators of antenatal and postnatal physical activity when combined with physical activity companionship.

There is some disagreement in relation to intention, self-esteem and body image, and income inequality as important determinants of physical activity during pregnancy and postpartum. The literature review and intervention review showed that intention was an important determinant during the second and third trimester and possibly during the postnatal phase. However, the longitudinal study did not find intention to be an important determinant during the first or third trimester or the postnatal phase, and questioned the influence of intention during the second trimester. It appeared that although women had the intention to become more active, other barriers had prevented them from doing so. In regard to self-esteem and body image, the literature review showed that body image was an important determinant of physical activity during motherhood and a possibly important determinant of physical activity behaviour during the third trimester. The longitudinal did not find this determinant to be important in relation to physical activity

during any stage of pregnancy or during the first three months postpartum. The longitudinal study explained that although women were often dissatisfied with their body during the postnatal phase, it did not influence their physical activity behaviour. During pregnancy, self-esteem or body image issues were not reported. The literature review also indicated income inequality as a potentially important determinant of physical activity behaviour during pregnancy and postpartum. The longitudinal study however, indicated that physical activity behaviour was not influenced by income but by whether physical activity was considered a priority.

Determinants that appeared to be important in terms of antenatal and/or postnatal physical activity according to the findings of the longitudinal study, the literature review and/or the intervention review included: sickness, physical discomfort and tiredness, self-worth, priority, social networks, costs of physical activity and childcare facilities, social norm in relation to physical activity, gender role expectations, lack of time, social role strain, aesthetics, neighbourhood walkability, availability of exercise facilities, neighbourhood safety and weather conditions. Self-worth has only been addressed in two intervention studies and its impact on physical activity was not clear. However, prioritising the needs of others over own needs – which is strongly related to self-worth – has been identified by many studies within the literature review as an important factor that underpins women’s decision-making in relation to physical activity. The longitudinal study contributed to the literature by identifying self-worth as an important determinant of antenatal and postnatal physical activity. It must be noted though that during pregnancy, this determinant was only important in relation to multigravidas. Since women often did not know about the benefits of physical activity for the foetus, being active was commonly perceived as something that would only take away time from their maternal responsibilities.

The longitudinal study also identified a relatively novel determinant of physical activity during pregnancy: social stigma. As has been described in Chapter 8 section 8.1.1, the stigmatisation of pregnancy was found to form an important barrier to physical activity during pregnancy, which was not identified by the literature review as a barrier to antenatal physical activity.

Relatively novel determinants of postnatal physical activity were also identified: social capital and cohesion, identity struggles, social norms related to public breastfeeding, and instrumental support in terms of postnatal contact with health professionals. These findings add therefore to the existing literature on postpartum physical activity. The association between social cohesion or aspects of social capital and physical activity (see Chapter 7, section 7.2.5) have not been investigated previously in relation to postpartum. In addition, the finding in the longitudinal study that identity struggles (common among first-time mothers) were associated with postpartum physical activity behaviour (see Chapter 8, section 8.1.4) also contributed to the understanding of postpartum physical activity. Another relatively novel finding was the association between public breastfeeding related social norms and physical activity (see Chapter 8 section 8.1.5). In addition, the findings in the longitudinal study that insufficient postnatal contact encumbered physical activity (see Chapter 7, section 7.2.1.4) also contributes to the existing literature as no published, peer-reviewed studies were located within the reviewed literature that identified insufficient postnatal contact as a barrier to postnatal physical activity behaviour.

Future interventions can benefit from addressing the determinants that have been proven to be important in the literature review, intervention review and the longitudinal study (see Table 9.1). Based on these important determinants, the following sections discuss contextual considerations for future intervention design and the implications for physical activity interventions among pregnant and postnatal women. Intervention suggestions were not based on determinants that were only found to be important in the literature review and/or intervention review.

9.2 Contextual Considerations for Future Intervention Design

Chapter 6 discussed the life and physical activity changes during pregnancy and postpartum. Figures 6.1 and 6.2 provide a general overview of these changes, which can be viewed as pregnancy and postnatal specific context-related complexities. Chapter 8 provided context in relation to dominant ideology around physical activity, pregnancy and motherhood that appeared to influence participants' physical activity behaviour during pregnancy and postpartum. It is important to consider these complexities when

developing interventions; physical activity interventions are more likely to be effective if they reflect understanding of women’s lives and experiences during pregnancy and postpartum and how these lived experiences relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. Such intervention strategies have the potential to increase women’s individual agency and empower women to take effective action towards addressing their experienced restrictions that encumber physical activity. Contextual considerations for future intervention design are presented in Table 9.2. These contextual considerations have been included in the intervention suggestions in section 9.3.

Table 9.2 *Contextual considerations for future intervention design*

<p>Early pregnancy experiences: physical wellbeing and acceptance of pregnancy</p>	<p>PA and other natural remedies such as small snacks,⁴²⁹ ginger root extract and acupressure,⁴³⁰ can reduce nausea and vomiting, commonly experienced in the first and start of the second trimester, which could facilitate PA and could improve women’s wellbeing.</p> <p>Women may benefit from support services for unexpected pregnancies, especially among single pregnant mothers (to be). Without such support, women are less likely to engage in self-care practices such as PA.</p>
<p>Social stigmatisation of pregnancy</p>	<p>The social stigmatisation of pregnancy, resulting in women being perceived as infirm and/or as disabled, encumbers PA. This stigmatisation should therefore be addressed.</p>
<p>Self-care plan</p>	<p>Stimulating women during pregnancy and postpartum to make PA and other self-care plans with their partner and/or supportive others can facilitate PA and other types of self-care.</p> <p>The second trimester is the best time to start promoting PA as women generally feel less sick and fatigued during this time.</p>
<p>Important, trimester-specific messages</p>	<p>Providing information in the second and third trimester on ways in which PA can assist with preparing for and recovering from labour could motivate women in becoming more active.</p> <p>In the third trimester, it is important to address the potential postnatal difficulties (e.g., feeling emotionally overwhelmed by the lack of sleep and the burden of the ‘good’ mother identity they need to perform) that women may experience and how PA can improve postnatal mental health, physical recovery from labour, maternal coping skills and family wellbeing.</p>

'Good' mother ideology	Dominant ideology around what constitutes a 'good' mother, that is to put one's own needs last, encumbers PA. Action needs to be taken to reduce the restrictions around maternal identity.
Postnatal contact	Improving social contact between new mothers and health professionals in order to reduce the risk of psychological decompensation (see Chapter 6, section 6.1.5) appears to be key for improving PA and wellbeing among postpartum women (especially among first-time-mothers).
Dominant ideology around public breastfeeding	<p>A dominant social norm that urges women to breastfeed at home may reduce the likelihood of women engaging in activities outside the domestic space during the postnatal phase. Public breastfeeding needs to be promoted as 'normal' to increase women's freedom in choosing where to breastfeed.</p> <p>Providing more parent rooms may increase the likelihood of women engaging in activities outside the domestic space. However, providing more parent rooms may be counterproductive in establishing more positive attitudes towards public breastfeeding in other public places (e.g., parks, cafés and pools).</p>

PA= Physical activity

9.3 Intervention Suggestions to Improve Physical Activity among Pregnant and Postnatal Women

The results of the socio-ecological analysis employed in the literature and intervention review, and in the first part of the longitudinal study, addressed the important determinants of physical activity during pregnancy and postpartum. The feminist analysis added to this understanding by describing the tensions that exist, and the complexity and socially situatedness of antenatal and postnatal physical activity. In terms of physical activity interventions, if a beneficial increase in physical activity among pregnant and postnatal women is to be achieved, it is important to listen to what women have to say. It is therefore key to include them in the process of intervention design, rather than telling women what to do and attempting to force them to conform to dominant 'expert' messages about health.¹¹² Health promotion professionals and physical activity advocates are likely to be more successful in bringing about change – in a way that is meaningful to women – if their approach reflects understanding of women's physical activity experiences and how they give meaning to such lived experiences during pregnancy and postpartum.

The intervention suggestions discussed in the following sections were based on:

- 1) the comprehensive determinant analysis (see Tables 9.1 and 9.3);
- 2) women’s life and physical activity changes (see Chapter 6) and the feminist analysis (see Chapter 8). The contextual considerations based on Chapters 6 and 8 have been summarised in section 9.2.
- 3) what women in this study expressed to value in general and about physical activity during pregnancy and postpartum, and on their own intervention suggestions (see Table 9.3).

These intervention suggestions provide insights on ways in which physical activity environments and interventions could be improved to accommodate women’s ideas, needs and perspectives. Table 9.3 provides an overview of the implications for future interventions and shows which determinants are addressed within each strategy suggestion. In addition, Appendix 8 describes these determinants in more detail as characteristics that need to be addressed in order to improve future intervention design. These intervention suggestions could be used as part of the “Active lifestyles” goal outlined in the Sunshine Coast Regional Council’s “Corporate Plan 2009-2014”.⁴³¹

Table 9.3 *Implications for future interventions*

Strategy suggestions	Determinants		
	Individual	Social environment	Physical environment
Informational support <ul style="list-style-type: none"> • <i>Addressing sickness, tiredness and other physical discomfort</i> • <i>Addressing the social stigma attached to pregnancy</i> 	behavioural beliefs, knowledge, tiredness and physical discomfort, self-efficacy, guilt	informational support, support at work, social norm, gender role expectations, social role strain and social stigma	
Finding a healthy balance: self-care and care for others	behavioural beliefs, knowledge, self-efficacy, priority, guilt, self-worth,	informational support, support at work, social norm, gender role expectations, social role strain	
PA self-efficacy: barrier self-efficacy and self-regulatory efficacy	self-efficacy		

Partner support and equal division of leisure time	self-efficacy	gender role expectations, social role strain, emotional support, instrumental support, support at work, PA companionship	
Improving postnatal contact with health professionals	knowledge, self-efficacy	informational and instrumental support	
Stimulating inter-women communication	self-efficacy and motivation	emotional support, social networks and social interaction, gender role expectations, social capital	
Local and low cost exercise groups and companionship	behavioural beliefs, motivation, self-efficacy	PA companionship, emotional support, social networks and social interaction, PA related social norm, social stigma, social capital	costs of PA and weather conditions
Building social capital		PA companionship, social networks and social interaction, social norm, social capital	
Promoting public breastfeeding	behavioural beliefs and self-efficacy	social norm	
A physical environment that promotes physical activity	motivation, self-efficacy	social cohesion	aesthetics, neighbourhood walkability and neighbourhood safety

PA= Physical activity

Table 9.4 summarises what women in the longitudinal study expressed to value in general and about physical activity during pregnancy and postpartum, and their intervention suggestions. The perspectives presented in this table could inform health promotion professionals and physical activity advocates such as primary health care providers, midwives, physiotherapists and fitness professionals. These views and lived experiences have the potential to complement and enrich health promotion professionals' and physical activity advocates' understanding of women's physical activity experiences. Without this understanding, experts can tend to prescribe treatments that do not acknowledge women's everyday constraints. By attempting to understand the full context of women's participation in physical activity as experienced by women, health experts

may be better positioned to work together with women towards change.^{148, 151, 152} In the longitudinal study, women considered the following types of support to be key for them to be able to engage in sufficient physical activity for health benefits: presence of low-cost physical activity groups for pregnant women and mothers with children, opportunities for developing friendships with other mothers (to be), emotional support and advice from other mothers (to be) and health care providers to build confidence in their ability to cope with pregnancy and motherhood related struggles. These intervention suggestions and what women in this study expressed to value (summarised in Table 9.4) have assisted the development of the intervention suggestions discussed in the following sections.

Table 9.4 *Women's key perspectives*

Key Concerns	Women's key perspectives
<p><i>What do women value during pregnancy and/or postpartum?</i></p>	<ul style="list-style-type: none"> • Their own physical and mental health, • Their baby's health, • Happiness within their family, • Sleep and relaxation • Feeling in control of their life • Feeling supported by their partner • Being a good mother and wife, • Not completely losing who they were before they became a mother
<p><i>What do women value about PA during pregnancy and postpartum?</i></p>	<ul style="list-style-type: none"> • PA improves state of mind; relaxation, feeling good, enjoyment • PA helps with weight management during pregnancy and weight loss after pregnancy • PA helps with preparation for labour • PA made them feel fit and strong and helped with keeping a good posture • PA provided women to spend time with their partner and children • Potentially (there was uncertainty) good for their own health and their baby's health • PA provided them with a good reason to leave the house • PA with others gives provided the opportunity to socialise • PA helped with creating a happy life; getting outside, and being active and social with others

<p><i>What are women saying about how PA environments and interventions can be improved to accommodate their ideas, needs and perspectives?</i></p>	<ul style="list-style-type: none"> • More information for pregnant women and the wider public to establish acceptance of PA during pregnancy • Exercise classes for pregnant women and mothers with babies and children <ul style="list-style-type: none"> ○ \$10-\$15 per class is too much ○ Needs to be local ○ Offered at times that suit working women and stay at-home mothers • Walking groups for pregnant women and mothers with young babies • More opportunities to improve their social network consisting of peers
	<ul style="list-style-type: none"> • Support groups to help and build confidence in their ability to cope with the struggles of pregnancy and motherhood • Information from child health nurses at mothers' or parenting groups about the importance of keeping active and PA guidelines and information about available exercise classes and walking groups • More postnatal home-visits to give mothers more peace of mind that their baby is healthy and that they're "doing the right thing as a mother". • Childcare options at exercise classes or groups need to be available • A pill that would take away nausea and tiredness during pregnancy

PA= Physical activity

The following intervention strategies are based on the contextual considerations (see Table 9.2), on the comprehensive determinant analysis (see Table 9.3), and on women's key perspectives (see Table 9.4).

9.3.1 Informational Support: Improving Knowledge and Creating Supportive Social Norms

The literature review (Chapter 4, section 4.2.1.2), intervention review (Chapter 5, section 5.1.4) and longitudinal study (Chapter 7, section 7.2.1.6 and Chapter 8, section 8.1.1) identified informational support as an important strategy to improve physical activity among pregnant and postnatal women. Providing women with information about the physical activity guidelines and the benefits of physical activity can provide more clarity

in relation to the risks of antenatal and postnatal physical activity and may assist in developing more positive beliefs.

It is important to develop accessible information that includes key messages related to physical activity during pregnancy and postpartum. Table 9.5 provides an overview of the key issues that need to be addressed. This table can be used as a guideline by the media, health promotion professionals and those who advocate physical activity such as primary health care providers, midwives, and fitness professionals. The table provides an overview of topics, which address or discuss methods for improving self-care and physical activity among pregnant and postnatal women. Table 9.5 does not include detailed information in relation to physical activity guidelines or physical and psychological health benefits, but Tables 1.1-1.6, and Appendix 1 can be used to provide further information and assistance.

For health care providers these messages could serve as guidelines for therapeutic practice when seeing a (new) pregnant or postpartum patient or client. Tables 1.1 and 9.5 could also be included in the physical activity recommendations within the “Guidelines for preventive activities in general practice” developed by the Royal Australian College of General Practitioners.⁴³² To date, the physical activity recommendation only differentiates between adults and children; it does not include physical activity guidelines for pregnant and postpartum women. Many health professionals (e.g., general practitioners, physiotherapists, midwives, sport physicians, specialised fitness instructors) in various Australian states do have existing related resources, however this study reveals an ongoing need for interprofessional collaboration around provision of information and advice.

In relation to the media, local news TV channels, radio channels, local news papers, etc. could promote these messages at any time. The media could for example discuss the benefits of physical activity (see Chapter 1, section 1.3), the struggles pregnant women and mothers in the postnatal phase are facing (see Chapters 7 and 8) and tips on how to overcome them, and provide tips for partners, family, and friends on ways in which they can offer support. Including mothers as active participants in the development of such tip sheets could make it more likely for such sheets to offer valuable informational support.

Table 9.5 *Guideline for media, health promotion professionals and physical activity advocates*

<p>During pregnancy:</p> <ul style="list-style-type: none"> ➤ Promote PA during pregnancy ➤ Address the benefits of PA for mother, baby and family ➤ Inform women about ways in which sickness, tiredness and physical discomfort can potentially be reduced ➤ Explain the pregnancy PA guidelines ➤ Discuss the warning signs to discontinue PA and contact a doctor ➤ Inform women whom to contact if they have safety concerns ➤ Address the importance of self-care and PA ➤ Discuss the importance of talking to their partner about a continuous self-care and PA plan ➤ In absence of partner, discuss the importance of talking to a significant other about a continuous self-care and PA plan ➤ Address the restrictive definitions of a 'good' mother ➤ Discuss how self-care such as PA can help with mothering ➤ Inform first-time pregnant women of the common challenges during the postnatal period and where they can go for more information and support ➤ Address possible childcare support and other types of financial assistance ➤ Inform women about how to deal with the possibility of being stigmatised during pregnancy ➤ Address paid and unpaid leave options for both mother and father
<p>After pregnancy:</p> <ul style="list-style-type: none"> ➤ Promote postpartum PA ➤ Address the benefits of PA for mother, baby and family ➤ Discuss the postpartum PA guidelines based on the type of delivery ➤ Inform women whom to contact if they have safety concerns ➤ Address the importance of self-care and physical activity ➤ Discuss the importance of talking to their partner about a continuous self-care and PA plan ➤ In absence of partner, discuss the importance of talking to a significant other about a continuous self-care and PA plan ➤ Address the restrictive definitions of a 'good' mother ➤ Discuss how self-care such as PA can help with mothering ➤ Inform first-time mothers of where they can go for more information and support if they feel overwhelmed and/or struggle to cope with the challenges of motherhood ➤ Address possible childcare support and other types of financial assistance ➤ Address paid and unpaid leave options for both mother and father ➤ Address breastfeeding rights at work ➤ Promote public breastfeeding ➤ Inform women who wish to breastfeed in private about the location of breastfeeding facilities such as parent rooms (if these are available)

PA=Physical activity

Different media sources can be used to provide information on this range of topics. Mass media has been demonstrated to be an effective tool for promoting health messages and campaigns.^{433, 434} The most appropriate media available include television, radio, local newspapers, posters, newsletters, flyers, and bulletin boards.^{433, 434} For media campaigns to be effective, various issues need to be considered. Table 9.6 provides an overview of what campaign designers can do to increase the likelihood of developing a successful Public Health mass media campaigns. These suggestions have been taken from Noar⁴³⁵ and Randolph and Viswanath.⁴³⁶

Mass media campaigns have also been found to be more appropriate and effective when media authorities are 'on-side'.⁴³⁷ This research project has received media attention from Seven Local News Sunshine Coast, Buderim Weekly, "Hot FM" and ABC Sunshine Coast,⁴³⁸ which indicates that media authorities are likely to be 'on-side'. However, it has also been pointed out that when the behavioural goal is complex (such as increasing physical activity levels among pregnant and postnatal women), media campaigns are likely to be less effective and therefore need more supporting strategies.⁴³⁷ It is acknowledged that in order to beneficially increase women's physical activity behaviour during pregnancy and postpartum other strategies are needed, which are discussed later in this chapter. Another drawback is that a generous budget generally needs to exist for public health mass media campaigns to be effective.⁴³⁷ Not just TV advertisement, but also pamphlets and posters can be expensive depending on the quality and quantity. For media to be considered as a strategy in physical activity promotion, careful consideration of costs and benefits needs to be undertaken.

Although the media can play an important role in behavioural change, advertisements should not tell people such as pregnant and postnatal women or health professionals what to do. Feminist theorists have argued that the media should not use pregnant women (or any other individual) as vehicles for ideas around how women should behave.^{184, 185} As discussed throughout Chapter 8 pregnant women and mothers have always been a target for scrutiny.^{149, 150, 365-368, 382, 383} The scrutiny during pregnancy or the stigmatisation of pregnancy supports the medicalisation of pregnancy that treats pregnancy as if it were an illness.^{184, 380, 381, 387}

Table 9.6 *Summary of major principles of effective campaign design applied to Public Health mass media campaigns*

<p>Success is more likely when campaign designers:</p> <ul style="list-style-type: none">• Conduct surveys, in-depth interviews and/or focus groups with the target audience to clearly understand the behaviour and the problem areas• Use theory as a conceptual foundation to the campaign; theory will suggest which important areas need to be addressed by the media and will help ensure that campaign messages guide individuals through the process of attitude and/or behaviour change• Segment audience into meaningful subgroups based on important characteristics such as demographic variables, risk characteristics, experience with the behaviour, and personality characteristics• Use a message design approach that is targeted to and likely to be effective with the audience segment; develop novel and creative messages that will spark interpersonal discussions and may persuade individuals important to the target audience• Use social marketing tools to create appropriate messages for distribution• Place messages in channels widely viewed by the target audience; strategically position campaign messages within the selected channels• Create a supportive social environment that allows the target audience to make the recommended change• Conduct process evaluation including monitoring and collecting of data on implementation of campaign activities; ensure high message exposure among members of the target audience, including both reach and frequency• Use a sensitive outcome evaluation design that takes into consideration potential external factors that can influence/contaminate the campaign's influence on attitudes and behaviours. By taking such factors into consideration, more firm causal conclusions can be drawn in relation to the campaign's influence.
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Researchers have pointed out that pregnant women are under scrutiny by the media who have put a constant focus on the risks and hazards in relation to pregnancy,¹⁸⁴ leading to pregnant women being treated as 'vehicles' and 'targets' for social anxiety.¹⁸⁵ Sumner et al⁴³⁹ showed that television or other visual advertisement should be careful not to portray 'slim' looking pregnant women as pregnant women are sensitive to such images. Such images can cause body image distortion, which can have a negative impact on women's emotional health.⁴³⁹

In terms of the effectiveness of mass media campaigns, advertisements that tell others what to do also appears to be ineffective.⁴³⁷ In relation to physical activity promotion among pregnant and postnatal women, it is therefore important (for multiple reasons) that media messages do not tell women what to do, but create more awareness and knowledge around physical activity during pregnancy and postpartum. This increase in awareness and knowledge has the potential to increase women's agency, which can assist with increasing physical activity.

Further investigation is needed on ways in which media messages should be framed and how to best support health care providers and allied health professionals in providing physical activity advice and guidance during pregnancy and postpartum. The following sections (sections 9.3.1.1 and section 9.3.1.2) discuss suggestions on ways in which the media, health promotion professionals and physical activity advocates can increase awareness of natural remedies that can reduce sickness and physical discomfort. It also provides information on ways in which the stigmatisation of pregnancy can be addressed.

9.3.1.1 Addressing Sickness, Tiredness and other Physical Discomfort

This study indicates that pregnancy and postpartum were experienced as periods that included uncontrollable feelings of sickness, excessive tiredness and physical discomfort. For example, in the first trimester, women in this study experienced nausea and tiredness (see Chapter 6, section 6.1.1 and Chapter 7, section 7.1.6 for more detail), which reduced their physical activity behaviour. Women expressed that they wished they knew how to reduce sickness without taking medication. Interventions could focus on improving awareness of natural remedies among women. Previous research has shown that fresh air, consuming frequent small snacks⁴²⁹ and ginger root extract, and acupuncture⁴³⁰ may reduce nausea and vomiting.

In addition, many women in this study also experienced physical discomfort (see Chapter 7, section 7.1.6), which reduced their physical activity habits. Informing women about exercises that could help reduce physical discomfort during pregnancy may assist women in maintaining an active lifestyle. Strengthening, stabilising exercises, and sitting pelvic

tilt exercises can relieve pelvic and back pain⁴⁴⁰ with no adverse effects (e.g., maternal weight gain, gestational age at delivery, birth weight or height, delivery characteristics).

This study also showed that energy was something that many women lacked during pregnancy and postpartum. Advice on ways in which physical activity can increase energy levels and improve sleep^{64, 85} may lead to an increase in women's physical activity behaviour. Since the advice of midwives and general practitioners seems to have influenced women's physical activity behaviour, physical activity information may be more effective in increasing physical activity behaviour when received from these health professionals. Women in this study also mentioned that they would have more energy for leisure activities if their partner would help them with domestic chores such as doing the groceries and cooking. Partner support however will be discussed in more detail in section 9.3.4.

This strategy can be viewed as a relatively novel approach as no strategies were identified within the reviewed interventions that focused on these issues during pregnancy or postpartum. Table 9.5 (see section 9.3.1) provided an overview of key messages related to physical activity, which includes considerations regarding sickness, tiredness and physical discomfort. This can be used as a checklist by the media, health care providers and allied health professionals.

9.3.1.2 Addressing the Stigmatisation of Pregnancy

This study showed that lack of knowledge within society regarding the guidelines and benefits of physical activity can result in the perception that physical activity causes harm to the unborn child. The feminist analysis revealed that lack of knowledge in relation the strength of the pregnant body can lead to pregnant women being stigmatised as weak and fragile. In order to reduce this social stigma, it is important to increase community awareness in relation to the guidelines and benefits of physical activity during pregnancy, and provide women with the confidence that their body is strong enough (in most cases) to engage in regular exercise during pregnancy. The definition of overexertion is especially important to clarify in order provide women with some guidance and reassurance as to what is safe. It may also be beneficial to clarify that apart from a few

physical activity considerations (see Chapter 1), pregnant women can still be very active. Pregnancy does not turn women into weak and fragile beings, which is how some women felt they were treated (e.g., “I am not an invalid”). If there is a public understanding or social norm that physical activity during pregnancy is usually safe and beneficial for the woman and the baby, and that women are still capable of doing most activities, women would be more likely to feel supported rather than judged and stigmatised, which could positively influence their physical activity behaviour. Posters, television advertisements and informative sections in local newspapers addressing the importance and benefits of physical activity during pregnancy and after childbirth, could improve people’s attitudes towards physical activity during these phases in women’s lives. Such approaches could also use consciousness-raising methods³⁴⁸ to increase women’s awareness of how they have been socialised to feel about and approach physical activity.

Increasing knowledge and perceived benefits have been addressed in previous effective physical activity interventions (See Chapter 5, sections 5.1.1 and 5.1.4). However, these interventions did not aim to reduce the social stigma attached to pregnancy. In addition, the literature review did not locate any published, peer-reviewed studies that discussed the stigmatisation of pregnancy and/or its association with physical activity behaviour. Table 9.5 (section 9.3.1) provided an overview of these key messages that could be promoted by the media, health care providers and allied health professionals in order to assist in reducing the social stigma attached to pregnancy. However, this table does not include detailed information in relation to physical activity guidelines or health benefits. Tables 1.1-1.6, and Appendix 1 can be used to provide further information and assistance. It is important to note again that these messages should not be used to reinforce pregnancy as a vehicle for social anxiety, but rather to empower women to define their own notions of health, fitness and comfort.

The inclusion of strategies that target the stigmatisation of pregnancy (e.g., increasing awareness around antenatal physical activity guidelines, benefits of antenatal physical activity and the strength of the pregnant body) could potentially make a novel contribution to intervention research, and may improve future physical activity interventions in increasing physical activity during pregnancy. However, more research on the social stigmatisation of pregnancy in relation to physical activity is required.

9.3.2 Finding a Healthy Balance: Self-care and Care for Others

According to this study, the following determinants appeared to be important barriers to physical activity during pregnancy and postpartum: social role strain, gender role expectations, behavioural beliefs related to guilt, low self-worth, low self-efficacy, and lack of priority and time. However, social role strain, gender role expectations, guilt and low self-worth were only important determinants of physical activity during motherhood.

Women often experienced feeling incapable of finding a balance between fulfilling their own needs and the needs of others. The longitudinal study and literature review showed that one of the associations with this imbalance was the implicit social expectation that a 'good' mother should put the needs of her child(ren) and family before her own needs. Such a definition of a 'good' mother puts restrictions on self-care such as physical activity, breastfeeding choices and on maternal identity, which explains why many women struggled to combine pre-pregnancy and postnatal identity (e.g., career women and mother). Lawler⁴⁴¹ argued that "in nurturing the child's 'self', the mother's self threatens to disappear". There is an extensive amount of feminist literature around the concept of 'good mothering' and the ways in which it restricts women in the choices they make.^{149, 150, 365-368} Chapter 8 (see sections 8.1.2-8.1.5) discussed multiple definitions of a 'good' mother (e.g., a good mother puts own needs last and a good mother breastfeeds in private). This chapter argued that dominant ideology around what constitutes a good mother can restrict physical activity behaviour among mothers. The literature review and longitudinal study showed that it is important for society to acknowledge that a mother's physical and psychological wellbeing helps with being a 'good' mother and therefore could benefit the whole family, and that mothers are humans with basic needs and rights such as self-care.

Assisting women in establishing a healthy balance between self-care and care for others is a complex issue that needs further investigation. However, the longitudinal study and the literature review found four key issues of importance in increasing the likelihood of mothers engaging in leisure-time physical activity as a type of self-care: 1) addressing the restrictive definition of a 'good' mother, 2) increasing physical activity enjoyment, 3) preparing women for the struggles ahead, 4) addressing social support. Firstly, a starting point from which to move towards establishing a healthy balance between self-care and

care for others (which is an individual matter), could be addressing the restrictive definitions of a 'good' mother and provide women with supportive messages to find their balance (e.g., self-care, such as physical activity, can help with mothering). This could be addressed by the media, health care providers and allied health professionals (see Table 9.5).

Secondly, women in this study have expressed that for them to engage in regular leisure-time physical activity, that activity has to be enjoyable. The longitudinal study and the literature review showed that if the activity is experienced as a chore, this will not elicit a positive feeling and may therefore lose its priority in women's lives. Developing discussion/talk groups about how to be active in ways that are enjoyable or organising activities that are commonly enjoyed by women (e.g., walking, yoga, swimming and zumba) can be effective strategies.

Thirdly, it is important to prepare first-time mothers for the likely struggles they may face during the postnatal phase (see Chapter 8, sections 8.1.2-8.1.5). In the longitudinal study women have mentioned feeling overwhelmed and frustrated with the fact that no one had prepared them for it (Chapter 8, section 8.1.4). Such information could be provided by health care and allied health professionals, but social "get-togethers" can also be organised where multigravidas share their lived experiences with primigravidas.

Finally, women may need support to ensure they can accommodate sufficient physical activity in their daily routines. It is important to note here that not all women wish to engage in leisure-time physical activity. Promoting incidental activity (e.g., provision of practical advice about how to include sufficient physical activity as part of the daily routine) may be more effective in increasing physical activity among women who do not wish to participate in (more) leisure-time physical activity. Whether focusing on increasing leisure-time physical activity or incidental physical activity, partner support (or, in absence of a partner, support from family or friends) may significantly improve women's physical activity behaviour (see section 9.3.4). As discussed in section 9.2, it may be important for interventions to increase first trimester women's understanding regarding the importance of making physical activity and self-care plans and future arrangements with their partner and/or supportive others. In addition, the intervention

review (Chapter 5) showed that group discussions with peers were perceived as valuable emotional support. The facilitator of such group discussions can use consciousness-raising methods³⁴⁸ to increase participants' awareness of how they have been socialised to feel about and approach physical activity. Group discussions about the importance of making time for self-care and accommodating convenient physical activities in daily routines can increase women's level of agency, which can assist with increasing physical activity.

As acknowledged previously, the lack of balance in self-care and care for others as a barrier to physical activity among mothers is a very complex issue that needs further investigation. Particularly, how to address the restrictions that the current definition of 'good mothering' puts on women's physical activity behaviour needs further examination. It is important to address this as the current social construction of the 'good' mother contributes to the deteriorating psychological and physical health of women⁴⁴².

Recent research has indicated the many benefits that physical activity and other types of self-care can have for women, their family and others⁴⁴³. In addition to reducing stress and preventing depression, findings a balance may also assist in preventing a burnout, which is also commonly experience during motherhood⁴⁴⁴. Women in the longitudinal study and in previous studies included in the literature review, have mentioned the following psychological and social benefits of physical activity practices to self and family/others: feeling stronger, more energised, more relaxed, clears the mind, improves self-esteem, feeling better about yourself and your accomplishments, becoming more enjoyable to be around and becoming a better mother (see Tables 4.2, 7.3 and 9.4). Previous research⁴⁴³ found self-care practices to: assist women to return to their 'normal' and valued self, allow women to ameliorate negative thinking and facilitate emergence from negative or depressed states of mind when these were experienced. However, support for such practices was found to be limited⁴⁴³.

The intervention review did not locate any published, peer-reviewed studies that included strategies to address this imbalance between self-care and care for others in order to improve physical activity during pregnancy and postpartum. Including strategies to improve a balance between self-care and care for others could be viewed as a novel

approach that could support pregnant and postnatal women in accommodating sufficient physical activity in their daily routines.

9.3.3 Physical Activity Self-Efficacy: Barrier Self-efficacy and Self-Regulatory Efficacy

This study indicates physical activity self-efficacy to be an important determinant of physical activity behaviour during pregnancy and postpartum. After childbirth, low levels of self-efficacy also appeared to be associated with temporary psychological decompensation among first-time mothers (see Chapter 6, section 6.1.4 and Chapter 8, section 8.1.4). Women in this study mentioned struggling with implementing sufficient physical activity into their lives due to pregnancy and motherhood-related concerns. These women expressed a need for more support to increase feelings of confidence in their ability to cope with and/or overcome such struggles (see Table 9.4). In order to improve barrier self-efficacy, interventions may benefit from addressing the common obstacles encountered during pregnancy and motherhood (as explained in Chapters 4, 5, 7 and 8), and provide women with skills to overcome these barriers. Workshops and group discussions could assist women with overcoming these barriers and could provide women with knowledge and skills to challenge existing social structures that encumber physical activity. Self-regulatory efficacy could be increased by providing women with a pedometer; brainstorming realistic expectations; teaching women goal-setting skills and skills to schedule physical activity; and assisting women to identify the types of support they need and the people who could provide that support. These strategies have been used in previous effective physical activity interventions among pregnant^{336, 342} and postnatal women^{334, 345} (see Chapter 5, sections 5.1.5 and 5.3). In addition, the feminist analysis indicated that women's needs to increase their physical activity self-efficacy are ever-changing over the course of pregnancy and postpartum. Self-efficacy related strategies must therefore be developed taking into consideration these changes (see Chapters 6 and 8), by providing support in matters such as: sickness, tiredness, physical discomfort, stigmatisation of pregnancy, social expectations around how they should behave as mothers including breastfeeding practices. Such approaches can empower women to exert more control over their physical activity choices, which can facilitate increasing physical activity.

9.3.4 Partner Support and Equal Division of Leisure Time

The overall study showed that social role strain, gender role expectations and a lack of partner support contributed to insufficient physical activity, while partner support facilitated physical activity during pregnancy and childbirth. Encouragement to be active and companionship during activities, such as walking, were reported as valued motivators of physical activity (see Table 9.4). Companionship was also mentioned as something that made physical activity more enjoyable and gave women more confidence in their ability to engage in leisure-time physical activity, because of the support of another person or group. After childbirth, physical activity companionship was also commonly perceived by new mothers as something that provided them with support when consoling their crying baby in public as this was often perceived as stressful. Future interventions may therefore be more effective in increasing physical activity among pregnant and postnatal women if strategies were focused on increasing partner support, or in the absence of a partner, support from significant others.

The literature review and longitudinal study identified shared childrearing and domestic workload as key for women to be able to engage in sufficiently physical activity and find a balance between self-care and care for others.^{246, 252, 265, 296} During the pregnancy and postpartum, a lack of support with domestic chores and childrearing was commonly reported as a physical activity barrier. This is a complex issue, especially when there are multiple children to look after and/or when the partner had to work long hours or had to work away for longer periods of time as was mentioned by some women in the longitudinal study. According to the women in this study (see Chapter 8, sections 8.1.2-8.1.4), the social role of the mother puts many restrictions on her personal freedom, which reduces opportunities for physical activity. However, rather than focusing on an equal division of work, it may be easier and therefore more effective for interventions to focus on an equal division of leisure-time.

As addressed in sections 9.2 and 9.3.2, future interventions could aim to increase understanding among pregnant women and their partners of how making physical activity and other self-care plans could assist with engaging in sufficient physical activity and other self-care practices. The longitudinal study showed that although financial and other related arrangements were discussed with their partner, discussions about physical

activity and other self-care plans were uncommon. The media, health care providers and physical activity advocates could discuss how such plans can facilitate physical activity (see Table 9.5). In the absence of a partner, it may be beneficial to address other significant others to provide the potentially needed support. In addition, single women may also benefit from being informed of support services available to them.

Current policies, as explained in Australia's Paid Parental Leave Scheme⁴⁴⁵, the National Employment Standards⁴⁴⁶ also offer opportunities for a more equal division of leisure-time. These policies may be beneficial for those families who wish to share parental leave and the role of the primary care giver. Two-parent and single-mother families could also be made aware of possible parenting and childcare-related financial assistance, such as: Parenting Payment; Child Care Rebate; Child Care Benefit; and Jobs, Education and Training Child Care Fee Assistance⁴⁴⁷. As shown in the literature review and longitudinal study, childcare support provides opportunities for physical activity among mothers. However, childcare support may not facilitate physical activity during the first three postnatal months, as women mentioned not wanting to leave their child at childcare facilities or with anyone else during this time. Although childcare support and other types of financial assistance depend on income and are unlikely to be sufficient in terms of establishing a division of leisure time between mother and father, these policies do, to a certain degree, provide opportunities for physical activity. The promotion of such policies (see Table 9.5) can therefore be recommended.

The intervention review (see Chapter 5) showed that previous effective interventions included the following strategies to address social support, which could be used to increase partner support or support from a significant other: assistance in identifying the needed type of support;^{12, 341} regular SMS to remind partners or supportive others to provide physical activity support;³²⁹ face-to-face advice about how to establish encouragement for physical activity;³³⁵ and provision of a manual that includes tips on building social support for new physical activity patterns.^{330, 336}

Although previous physical activity interventions included social support strategies to increase physical activity among women, there were no published, peer-reviewed studies identified in the intervention review that focused on partner support or the division of

leisure time. Future interventions may be more effective in increasing physical activity behaviour among pregnant and postnatal women if these areas are addressed and if such strategies are developed in close collaboration with women and their partners or significant others.

9.3.5 Improving Postnatal Contact with Health Professionals

The longitudinal study identified that postnatal contact with health professionals was lacking in terms of home visits and phone calls (see Chapter 7, section 7.2.1.4). This was commonly addressed as a barrier to postnatal physical activity behaviour, especially among first-time mothers, because it led to uncertainty regarding their baby's health, and low levels of maternal self-efficacy prevented them from getting into an anxiety free state of mind. During the postnatal phase, primigravidas commonly expressed a loss of control over their life, which has been described in Chapter 6, section 6.1.5 as a phase of psychological decompensation, and has been described further in Chapter 8, section 8.1.4. First-time mothers reported that more contact with health professionals was needed to be sure their baby was healthy and to ensure they were "*doing the right thing as a mother*" (see Table 9.4). This assurance was expressed as needed to be able to focus on physical activity and other types of self-care. Improved postnatal contact with health professionals and support in dealing with motherhood-related struggles can make first-time mothers feel less overwhelmed and more empowered as this contact and support is likely to improve their maternal self-efficacy.

As discussed in Chapter 7, section 7.1.2.3, previous research identified a relative scarcity of postnatal contact in Queensland,³⁷⁶ which led to the development of the UPNC initiative in order to increase the amount of postnatal contact after women are discharged from a public hospital.⁴⁴⁸ Evaluations of this initiative showed that the regional public hospital, used for recruitment purposes in the longitudinal study, had a low score in relation to postnatal contact (i.e., phone calls and home visits).³⁷⁷ More action to improve postnatal contact with health professionals is therefore required. As was addressed in the longitudinal study (Chapter 6, section 6.1.5 and Chapter 8, section 8.1.4) and in previous research,^{354, 355} concerns for the mother's life, skills, and experiences are relatively overlooked after childbirth, because the main focus is on the baby. The findings in the

longitudinal study revealed the need for more professional postnatal support that is focused on both the mother and the baby. These findings agree with Seel³⁵⁴ and Oakley³⁵⁵ who argued the need for reintegrative practices and recognition of women's personal circumstances and lived experiences during pregnancy and after childbirth. The provision of suitable support could significantly improve the journey to motherhood experience. However, further investigation is required to determine ways in which postnatal contact with health professionals can be improved while also encouraging increased physical activity among mothers.

In addition, health care providers can benefit from having a comprehensive and up-to-date understanding of the physical activity guidelines and benefits of physical activity during pregnancy and postpartum. By attempting to understand the full context of women's participation in physical activity, as experienced by women, health professionals could be better positioned to work together with women towards change. Workforce development through education is an important vehicle to disseminate guidelines which may assist health professionals to provide patients or clients with quality advice. The antenatal and postnatal physical activity guidelines, that can be used by health care providers and physical activity advocates to promote physical activity, have been described in Table 9.5. However, this table only provides a general guideline and therefore does not include specific information on antenatal and postnatal physical activity guidelines or benefits. Tables 1.1-1.6, and Appendix 1 can be used to provide further information and assistance.

The intervention review did not locate any studies that included strategies that aimed to improve postnatal contact with or support from health professionals. Including strategies that focus on such aspects may assist future interventions in increasing physical activity among postnatal women.

9.3.6 Stimulating Inter-Women Communication

This study indicates that improving social networks and interaction between pregnant women and mothers within the same neighbourhood have the potential to facilitate physical activity and improve wellbeing, because such interaction was reported to

increase enjoyment and motivate women to be active. Women in this study mentioned that more opportunities were needed to improve their social network of peers (see Table 9.4). Social networks have the potential to improve support for physical activity and social cohesion, which have previously been addressed as potential determinants of physical activity among women, especially mothers.^{28, 250, 257, 275, 288} Talking about maternal concerns and stresses, and receiving advice from other mothers, could also increase women's sense of maternal self-efficacy, making them feel more capable of meeting their own needs and the needs of their baby. In this study, participants also believed strong social networks to prevent isolation and depression. Stimulating inter-women communication could increase social support, and decrease social isolation, which has been identified within the literature review to increase the risks of depression and insufficient physical activity.^{249, 250, 268, 282}

Websites such as www.bubhub.com.au, social.kidspot.com.au, or www.huggies.com.au, and Facebook pages for Sunshine Coast mothers were identified by women in this study as effective communication tools. Advertising the existence of these websites and/or creating new websites or other social media options to facilitate interaction, friendship development, and the organisation of exercise groups could be a high leverage point for strategy development in order to increase physical activity. According to a recent study in Australia, motherhood was at times described as an isolating experience. Mothers commonly used the internet to enhance social relationships and Facebook was by far the most popular website, typically accessed several times each day.⁴⁴⁹ An intervention delivered via Facebook was reported to be appealing as women believed it to enhance their motivation to adhere to a physical activity program.⁴⁴⁹ Facilitators of online or face-to-face group discussions could use consciousness-raising methods³⁴⁸ to increase women's awareness of how they have been socialised to feel about and approach physical activity, and could provide women with knowledge and skills to challenge existing social structures that encumber physical activity

The intervention review did not locate any studies that aimed to improve social networks and interaction among pregnant women and mothers. According to the longitudinal study and the literature review, increasing social networks and interaction among women could increase physical activity. Strategies that aim to generate social networks and social

interaction have the potential to empower women to exert more control over their physical activity choices, which can facilitate increasing physical activity. However, such strategies require further investigation and input from women.

9.3.7 Local and Low Cost Exercise Groups and Companionship

The longitudinal study identified physical activity companionship, through exercise classes or companionship from partner, family and friends, as facilitators of antenatal and postnatal physical activity. The opportunity to be active with other pregnant or postnatal women while being able to socialise, was reported to be greatly valued as it would make physical activity more enjoyable and less of a chore (see Table 9.4). The behavioural belief that physical activity is enjoyable rather than a chore was identified in the longitudinal study as a facilitating behavioural belief in relation to antenatal and postpartum physical activity behaviour. This study furthermore showed that during pregnancy, exercise groups were believed to offer possibilities for developing friendships and sharing the excitement of having a(nother) baby. After childbirth, building friendships through exercise groups was perceived as important for their personal happiness and mental health, but was also considered to be important to ensure their children had other children to play with in the future.

Community exercise groups also have the potential to increase social cohesion. “Getting out of the house”, socialising and talking about postnatal struggles were perceived as personal strategies that assisted with staying grounded and maintaining a healthy balance in life. Such strategies were also perceived to prevent isolation and postnatal depression. Participants in this study mentioned they preferred exercise classes or groups to be professionally guided, pregnancy or postnatal specific, local, on a no contract basis, allow babies and children, be breastfeeding friendly, and be offered at various times during the day to accommodate employee and carer responsibilities (see Table 9.4).

The longitudinal study and literature review identified costs of exercise facilities or groups as a barrier as well as a facilitator of physical activity. Low cost exercise groups or classes with an upfront payment is therefore suggested to increase participation rates while ensuring women are able to afford such groups or classes. In addition, hot and wet

weather conditions have been identified as important barriers of physical activity during pregnancy and postpartum. Future intervention strategies may therefore benefit from ensuring that exercise classes can be offered outdoors and indoors, depending on weather conditions and time of the day. However, if weather conditions and time of the day allow outdoor exercise, exercise groups may be best held outside as women mentioned to receive more benefits from being active “in the fresh air”. Especially during the first trimester and postpartum women preferred to be active outdoors. During the first trimester, women reported to avoid indoor exercise facilities, because exercising indoors made them feel sicker. In the postnatal period, women reported wanting to be outside because they felt housebound.

Increasing the availability of physical activity opportunities by providing women with local exercise groups is expected to improve women’s physical and psychological wellbeing during pregnancy and the postnatal phase. Engaging in enjoyable activities with other pregnant women and mothers who are experiencing similar struggles (e.g., physical discomfort, fatigue, balancing self-care and care for children) could increase motivation and support for physical activity. It is also likely to benefit their mental wellbeing (see Table 1.1), which may improve their ability to deal with the multiple demands of motherhood. Improved maternal self-efficacy could increase their sense of control over their life, which in turn could make them more capable to meet personal and family needs. Future interventions could also focus on increasing physical activity companionship from partner, family and friends as this study showed that not all women wanted to join an exercise group.

Effective interventions identified within the intervention review included the provision of exercise classes or groups among pregnant and postnatal women (see Chapter 5, section 5.2.2). Findings within the longitudinal study confirmed that providing exercise classes may be effective in increasing physical activity behaviour, but pointed out that exercise classes may need to conform to the previously mentioned criteria (e.g., low cost, local, on a no contract basis, and allow babies and children) for pregnant women and mothers to use such classes. These criteria add to the existing intervention literature. The ways in which to develop such classes and to improve companionship from partner, friends and family need to be further investigated with input from women.

9.3.8 Building Social Capital

Social cohesion and social capital have been identified as important determinants of physical activity behaviour among women and mothers (see Chapter 4, section 4.2.3.1), and also as important determinants of physical activity during the first three months after childbirth (see Chapter 7, section 7.2.5). Future interventions may benefit from including strategies that focus on building social capital to increase social cohesion within neighbourhoods. The intervention review (see Chapter 5, section 5.2.3) located one study²⁸⁸ that aimed to improve social capital and cohesion. This intervention succeeded in increasing local government involvement in the formative stages of the project, which led to more involvement throughout and after the project. Interviews with staff members showed that after the project, they were more aware of how physical activity events and the promotion of physical activity can contribute to more positive communication channels between the local government and community, and to a strengthened sense of community.

Strategies could focus on improving a sense of community by improving social networks within neighbourhoods. Improving opportunities for women to engage in conversation and form new friendships has been identified in the literature review and longitudinal study as key if improved physical activity levels and wellbeing among pregnant women and mothers is to be established. Future interventions may also be more effective in increasing physical activity if these would aim to improve collaborative action towards improving the living environment and physical activity friendliness within neighbourhoods (see Chapter 4, section 4.3.1 and 4.3.2, and Chapter 7, section 7.3.1).

Within Australia, research has shown that community-based physical activity programs have the potential to improve physical activity behaviour in participants and the community's population as well as increase social cohesion via building elements of social capital such as trust, reciprocity, participation in networks, and social norms.⁴⁵⁰ As was found in the longitudinal study (see Chapter 7, section 7.2.5), social media can play an important role in establishing social networks. However, more research is required on the ways in which social capital and social cohesion influence women's physical activity behaviour during pregnancy and postpartum, and on how to build social capital in a way that facilitates physical activity during and beyond this life phase.

9.3.9 Promoting Public Breastfeeding

The longitudinal study showed that it was very common to exclusively breastfeed at home, especially among first-time mothers, because newborn babies need to be breastfed every 2-3 hours.^{451, 452} As a result, many women mentioned feeling trapped inside the house and explained this to be an important reason for being insufficiently active. The findings showed that home-based breastfeeding was not only reported to reduce leisure-time physical activity, but also incidental physical activity. Women who were walking to the shops, library or school to pick up their children during pregnancy, often mentioned they took the car in the postnatal phase to be back home in time to breastfeed (see Chapter 8, section 8.1.5). It is therefore speculated that women who are comfortable with breastfeeding in public would be more likely to go for a walk or engage in other activities (including incidental) outside of the home environment.

As was pointed out in Chapter 8, section 8.1.5, women's desire to leave the house competed with their desire to breastfeed at home. Breastfeeding has many benefits for both mother and baby.⁴⁵³⁻⁴⁵⁵ including the importance of breastfeeding to the mother-infant relationship.^{454, 455} It is important for mothers and babies to be together, whether it is during the act of breastfeeding or during an activity such as walking, not only to establish a secure attachment between mother and baby, but also for childhood development.^{456, 457} It is therefore important to reduce this tension between physical activity and breastfeeding to ensure women's breastfeeding and physical activity practices do not suffer. Promoting public breastfeeding could assist with this.

Chapter 8, section 8.1.5, described how women in this study perceived and experienced breastfeeding in public as stressful, because of a lack of confidence in consoling their babies if they cry. These women also cited the organisation required, before being able to leave the house, as another cause of stress. The women in this study also commonly expressed that they would feel embarrassed if others saw them breastfeed. Future physical activity interventions among postnatal women could benefit from including strategies that provide women with information on indoor activities they can enjoy with and without their baby. This may be particularly helpful for postpartum women who feel overwhelmed with stress at the thought of leaving the house, which has been mentioned by some women in this study (See chapter 8, section 8.1.5).

However, for women who want to leave the house, but feel restricted by the dominant ideology of having to breastfeed at home, strategies that focus on improving social attitudes towards public breastfeeding may be more helpful in establishing an active lifestyle. In order to increase physical activity outside the domestic space, future interventions may benefit from focusing on changing social norms towards breastfeeding in public, on increasing confidence in women to breastfeed in public, and on providing public facilities for breastfeeding. An overview of recent reviews of interventions that focused on promoting breastfeeding argued the importance for interventions to focus on physical facilities for breastfeeding and/or on social factors such as the acceptability of breastfeeding in public places.⁴⁵⁸

Increasing public breastfeeding rates is a complex issue. Previous research showed that the development of parent rooms at gyms, shopping centres, beach-side attractions, restaurants and other businesses could be an effective first step towards increasing breastfeeding in public,^{458, 459} but such facilities need to be easily accessible, private and comfortable for women to use.⁴⁵⁸ However, this does not necessarily change people's attitudes towards seeing women breastfeed in public outside of such facilities. People could argue against breastfeeding in a park or restaurant when there are parent rooms in close proximity. Building parent rooms could endorse the view that breastfeeding still needs to be done away from the eyes of others.

Previous research has shown that exposure to breastfeeding is positively correlated with positive attitudes towards women breastfeeding in public.^{411, 413, 417} Hector et al⁴⁵⁸ found that mass media campaigns can play a vital role in challenging or influencing social norms by promoting positive images of breastfeeding and providing motivational messages. Although campaigns are unlikely to impact directly on the prevalence of public breastfeeding, they could change attitudes towards public breastfeeding that may affect the overall acceptance of breastfeeding by all groups within society, including mothers.⁴⁵⁸

In recent years, breastfeeding picnics and other breastfeeding awareness events have emerged in the UK and Australia as a means to increase exposure, show support for breastfeeding women and to draw attention to the need for legislation protecting breastfeeding.^{407, 460, 461} Breastfeeding picnics were preferred over demonstrations, as it

was believed to be more peaceful and more effective in portraying public breastfeeding as a normal and natural act of mothering.^{407, 460, 461}

Public breastfeeding has received a lot of attention in feminist literature^{403, 460, 462} and has also received recent media attention in Australia.^{407, 463} Feminist scholars^{403, 460, 461} have argued that women should not be confined to feeding in parent rooms. Therefore, the aim should be improving attitudes towards public breastfeeding, rather than increasing public breastfeeding facilities, by including a range of activities such as nurse-ins, demonstrations and breastfeeding picnics.^{403, 460, 461} However, social perceptions and norms cannot be changed overnight and should therefore be considered as a medium to long-term goal.

Relevant health professionals such as doctors, midwives and child health nurses could also support public breastfeeding by discussing public breastfeeding when visited by pregnant and/or postnatal women. Table 9.5 includes important messages related to public breastfeeding, which could be used as a guideline by the media, and health and fitness professionals.

The intervention review did not locate any physical activity interventions that focused on public breastfeeding. Improving public breastfeeding and attitudes towards public breastfeeding is a complex issue, which is beyond the scope of this study. Strategies that aim to facilitate and promote public breastfeeding can increase women's agency to exert more control over their breastfeeding choices, which may facilitate increasing women's physical activity behaviour postpartum. However, breastfeeding practices and perceptions towards public breastfeeding did not receive explicit investigation. Further research is required to investigate home-based versus public breastfeeding in relation to postpartum physical activity behaviour.

9.3.10 A Physical Environment that Promotes Physical Activity

The longitudinal study found environmental aesthetics, walkability, availability of exercise facilities and traffic safety to be important determinants of physical activity during each trimester of pregnancy and during the first three postnatal months. Findings

in the longitudinal study, however, also showed that indoor exercise facilities (see section 7.3.2) were only mentioned as needed facilitators of physical activity if the neighbourhood was perceived as physical activity unfriendly. Neighbourhoods that are physical activity unfriendly could start with subsidising current exercise groups or developing exercise groups for pregnant and postnatal women as detailed in section 9.3.7. In the long term, environmental aesthetics, walkability and traffic safety could be improved in neighbourhoods, to ensure physical activity opportunities become accessible for women of high and low socio-economic status.

The findings of the literature review and longitudinal study showed that walkable environments could improve walking, especially walking for transport. Since the Sunshine Coast is an area that is still expanding in terms of residential areas and is known to attract families,⁴⁶⁴ it is important for town planning to ensure that towns are designed in a way that destinations such as supermarket, shops, library and cafés are within walking distance. In existing towns, it is important to provide support to small local businesses. Such support could improve their competitiveness with larger, but more distant shopping facilities, and could help build social cohesion in neighbourhoods. Although there was no previous research identified that investigated the relationship between path connectivity and women's physical activity behaviour, research in the general population^{23, 324} suggests that women may be more likely to walk to places, if there are safe footpaths that connect their home with these various destinations.

In Australia, the Department of Transport recently developed a walkability audit tool for researchers⁴⁶⁵ and the National Heart Foundation developed a walkability checklist for residents.⁴⁶⁶ This checklist also includes a template letter to guide residents in writing to their local council. Such tools have the potential to empower communities to take action towards active living.

This research project showed that women may be more active if environmental aesthetics were improved by building parks, lakes, and planting trees. In terms of safety, the number and width of footpaths and cycle lanes could be increased, cycle lanes could be separated from main roads, park safety could be improved by fencing parks, and speed bumps could be built, so women can be active with their children in a safe environment. It may also be

beneficial to control vegetation around footpaths as too much vegetation around footpaths was perceived, by women in the longitudinal study, to increase the risk of potential harassment or assault.

The intervention review did not locate any previously effective physical activity interventions for women that include strategies to improve the physical environment. Addressing the physical environment therefore has the potential to improve future physical activity interventions among pregnant women and mothers. However, further investigation is needed on ways in which environmental aesthetics, walkability and traffic safety could be improved to assist in the increase of physical activity behaviour among pregnant women and mothers.

9.4 A Comprehensive Approach through Collaboration

Previously addressed intervention suggestions call for collaboration between numerous sectors within the community. Physical activity is an emerging priority within the health sector, the implications for Australia's economy are known, and there is growing interest in the role physical activity can play in increasing social capital and cohesion.⁴⁶⁷ Effective partnerships are needed to increase physical activity among women and others. Experts⁴⁶⁸ have shown that within Australia the following steps need to be taken to establish active communities:

- 1) Provide high quality policy-relevant evidence for the need to promote physical activity among pregnant women and mothers: This provides academics with the fuel to generate debate, policy-makers with levers they can use to advocate for policy reform; and practitioners with understanding to guide changes in practice.
- 2) Involve policy-makers and practitioners within and outside the health sector in the development of research questions and the creation of evidence: This helps to build partnerships and to ensure that the evidence is both 'policy-relevant' and has the potential to be translated into policy and practice. Importantly, partners who are actively involved in the research project are primed to take an interest in and work with the findings.
- 3) Ensure targeted dissemination of policy-relevant research findings to policymakers and practitioners within and outside the health sector: Researchers

interested in influencing policy and practice need to go beyond presenting findings at academic conferences and publishing in academic journals. Targeted written and oral presentations on antenatal and postnatal physical activity, including the benefits and what is needed to improve physical activity levels, are required to meet the needs of specific practitioner and policy-maker audiences.

- 4) Work with and influence knowledge brokers: Collaboration with knowledge brokers such as the National Heart Foundation of Australia is needed. In the past researchers contributed to the development of its policy and practice, while the Heart Foundation amplified the findings beyond what would have been possible if the researchers alone been responsible for disseminating the findings.
- 5) Advocate: Establishing active living among pregnant women and mothers is a multi-sector agenda requiring advocacy within relevant organisations and agencies to re-prioritise resource allocation and change policy, and externally to policymakers and in the media. Publicity in the mass media contributes to public debate and helps change community norms about the importance of physical activity during pregnancy and motherhood and the need and value of more social support and physical activity friendly neighbourhoods. These advocacy efforts can contribute to changing policy and practice.

A comprehensive approach and collaboration via extending current partnerships are key to increase physical activity among pregnant and postnatal women. Government, non-government and commercial organisations promoting physical activity among pregnant women and mothers “have a responsibility to educate community decision-makers about the new evidence and to advocate for an increased flow of resources and greater assignment of priority to physical activity programs”.⁴⁶⁷ Non-government organisations such as the National Heart Foundation of Australia and researchers have an important role in leading a physical activity advocacy initiative.⁴⁶⁷ Advocacy can take place through avenues such as the National Public Health Partnership, National Health Priority areas, the Active Australia initiative, Queensland Health, State Departments of Health, Education, Transport, Local Government, and Sport and Recreation.⁴⁶⁷

In addition, if an increase in physical activity among pregnant women and mothers is to be achieved, women have to be acknowledged as significant agents of change. This thesis

has shown that through listening to women's lived experiences, community workers for the government, non-government and commercial organisations can position themselves better to work with women towards change. General practitioners, midwives, obstetricians, physiotherapists, sport and recreation professionals, town planners and professionals within the transport sector could all have an influence on women's physical activity behaviour during and after pregnancy. There are many opportunity for establishing partnerships that have not been utilised previously in the endeavour to increase physical activity among pregnant women and mothers.

This thesis provided evidence yielded through a literature review, intervention review, and a longitudinal study that can be used to generate debate, levers to advocate for policy reform, and as informational support for practitioners to guide changes in practice. Ways in which to establish such partnerships and how to ensure effective collaboration to increase physical activity levels among pregnant women and mothers, goes beyond the scope of this PhD, but are important research questions for future research.

9.5 Chapter Conclusion

During the intervention review, no successful physical activity interventions for pregnant and postnatal women were located between January 2000 and December 2012. Section 9.1 provided a comprehensive overview of the individual, social and physical environmental determinants of physical activity during pregnancy and postpartum. Table 9.2 described contextual considerations for future interventions based on Chapter 6 and 8. Section 9.3 described intervention suggestions based on: the identified barriers and enablers of antenatal and postpartum physical activity behaviour; how women give meaning to their physical activity experiences, including how these relate to and are shaped by dominant ideology around physical activity; and on women's own intervention suggestions. This chapter highlighted the importance of including pregnant and postnatal women as active agents of change. This chapter also highlighted the importance of a comprehensive approach through collaboration.

Chapter 10. Final Conclusion

In conclusion, three studies have been conducted to inform the determinant analysis of physical activity behaviour during pregnancy and postpartum; a literature review on the determinants of physical activity, an intervention review, and a longitudinal study. The longitudinal study involved four intervals (1st, 2nd, 3rd trimester, and 3 months postpartum) and was subjected to a double analysis: a socio-ecological analysis and a feminist analysis. This research project has explored, identified, described and interpreted the determinants of physical activity among antenatal and postnatal women to develop a comprehensive understanding of the determinants of physical activity during pregnancy and postpartum and its contextual complexities (see Chapter 9, sections 9.1 and 9.2). Suggestions for future intervention design have been made to support the promotion of Sunshine Coast women's physical activity behaviour during pregnancy and postpartum (see Chapter 9, sections 9.2 and 9.3) in a way that shows understanding of the difficulties women experience during this time in their lives. The importance of a comprehensive approach through multi-level and inter-sectoral collaboration has also been highlighted (see Chapter 9, section 9.4). Limitations of the literature review, intervention review and longitudinal study have been described in Chapter 3.

This chapter presents final conclusions in relation to the research questions and how the longitudinal study contributed to the determinant analysis and implications for intervention design. This chapter ends with a discussion of future research suggestions, and highlights the importance for not delaying action in relation to the issue of insufficient physical activity during pregnancy and motherhood.

10.1 Conclusions in Relation to the First Research Question

In relation to the first research question "What part does physical activity play in women's lives and how do their lives and physical activity behaviours change throughout pregnancy and the first three postnatal months?", it can be concluded that women's lives and physical activity behaviour are constantly changing during pregnancy and postpartum. The second trimester appears to be the most stable time in terms of both life and physical activity changes. In terms of life changes, the first trimester was about trying

to adapt to pregnancy (e.g., sickness and making future plans) and the key theme in the second trimester was being more able to socialise and enjoy being pregnant. The third trimester was about adapting to physical restriction and getting ready for labour and the postnatal phase's main characteristic was adjusting or struggling to adjust to the birth of a baby (e.g. psychological decompensation, described in Chapter 6, section 6.1.5). Physical activity generally decreased during the first trimester as women felt sick and became more cautious and protective, and increased during the second trimester. Women's physical activity levels decreased again during the third trimester as women had to compromise their activities due to physical restrictions and discomfort. In the postnatal phase, women generally decreased their physical activity levels even further during the first 2-8 weeks postpartum and started to slowly increase their physical activity levels again after. Further details of these changes have been discussed in Chapter 6 (see Figures 6.1 and 6.2).

10.2 Conclusions in Relation to the Second Research Question

Chapters 4, 5, 7 and 8 provided an answer to the second research question "How do individual, social environmental and physical environmental determinants influence women's physical activity behaviour throughout pregnancy and the first three postnatal months?". In summary, behavioural beliefs, knowledge, motivation, self-efficacy, priority, self-worth, and tiredness and physical discomfort were important individual determinants of physical activity throughout pregnancy and postpartum. Self-worth only appeared to be an important determinant of antenatal physical activity among multigravidas. Since women were often not aware of the benefits of physical activity for the foetus, multigravidas commonly believed leisure-time physical activity would only take time away from their maternal responsibilities. During the postnatal phase self-worth was an important determinant among both multiparous and primiparous mothers. Again, prioritising needs of others over personal needs (due to valuing others more than oneself) acted as a barrier to physical activity during this period. In addition, sickness was only an important determinant of women's physical activity behaviour during the first trimester.

Important determinants of physical activity behaviour in the social environment included: emotional and instrumental support from informal sources; postnatal contact; informational support; physical activity companionship; social networks and social interaction; social norms related to physical activity; social stigma attached to pregnancy; costs of physical activity and childcare facilities; gender role expectations, lack of time and social role strain; and social cohesion and social capital. Social networks and social interaction appeared to only be important enablers of antenatal and postnatal physical activity if the social interaction was linked with physical activity companionship. Whether costs of physical activity and childcare facilities were perceived to be a barrier to physical activity did not appear to depend on income, but on whether women prioritised physical activity. In addition, costs of exercise facilities and childcare only appeared to be an important barrier to physical activity behaviour among women who perceived their neighbourhood to be physical activity unfriendly. Social stigma was only an important determinant of physical activity during pregnancy. Postnatal contact and social norms related to public breastfeeding were important determinants of postnatal physical activity behaviour. Social capital in relation to community connectedness was an important determinant of postnatal physical activity. Social capital was not explored during pregnancy, however established social networks via social media appeared to be associated with a sense of community connectedness and physical activity companionship. Social capital may therefore also be an important determinant of antenatal physical activity, however more research is needed. Gender role expectations and social role strain appeared to be important during the postnatal phase. During pregnancy however, these only appeared to be important among multigravidas in terms of explaining their physical activity behaviour. This indicates that when focusing on increasing physical activity among multigravidas, these determinants need to be addressed during pregnancy as well as in the postnatal phase.

Important determinants in the physical environment included: aesthetics, neighbourhood walkability, availability of exercise facilities, neighbourhood safety in terms of traffic safety and weather conditions. However, availability of and proximity to exercise facilities only appeared to be an important enabler among women who were living in physical activity unfriendly neighbourhoods and if other criteria related to exercise facilities (e.g., costs, proximity, and specific to pregnancy or mother with babies) were met. In relation

to walkability during the first and second trimester, proximity to facilities (e.g., supermarket) was only an important determinant of antenatal physical activity among multigravidas. In the third trimester and postpartum, proximity to facilities was also an important determinant of physical activity among primigravidas. Having facilities closer to home made physical activity easier as walking became more tiring during the third trimester. Postpartum, if shops were in close proximity, women commonly walked to shops for errands. If these were not in close proximity they would not walk as they had limited time before they had to breastfeed again, which they preferred to do at home.

Overall, it can be concluded that multigravidas and primigravidas have similar needs. However, issues related to self-worth, social role strain and gender role expectations may need to be addressed among multigravidas from the first trimester onwards, while when focusing on primigravidas, these determinants may not need addressing until the third trimester.

10.3 Conclusions in Relation to the Third Research Question

As described in Chapter 6, section 6.1.4, many women described pregnancy and early motherhood as a joyful time, but also as a time filled with struggles. Chapter 8 provided an answer to the third research question “How do women give meaning to their physical activity experiences in everyday life throughout pregnancy and the first three postnatal months?”. In summary, physical activity had multiple meanings for women in this study. These meanings were often expressed as tensions. Five key tensions have been identified: 1) Desiring physical activity, keeping the baby safe and social approval, 2) Being a ‘good’ mother and engaging in self-care, 3) Role fulfilment and physical activity, 4) Struggling and negotiating new identities, and 5) The wish to privately breastfeed yet not be housebound. These tensions show that physical activity had multiple meanings for women in this study. Physical activity was perceived as both enhancing and threatening their health at times, as something that competed with and helped with being a ‘good mother’, and as something that could restrict or expand their identity as mothers(-to-be). Physical activity was also described as something that was part of and competed with the fulfilment of daily responsibilities in terms of domestic chores and childrearing, and as something that competed with home-based breastfeeding.

The first tension was related to the stigmatisation of pregnancy. This stigma appeared to be based on a false dominant belief in society that upon pregnancy, women become fragile and weak and should therefore be treated differently to non-pregnant women. This stigma appears to be the consequence of a lack of knowledge and was found to encumber physical activity during pregnancy. This struggle between doing what feels right and doing what others think is right was a consistent struggle in relation to physical activity during pregnancy. Women's physical activity habits appeared to depend on how much they valued physical activity, how much they knew about the antenatal physical activity guidelines and benefits, and how much they valued social approval.

In relation to the second and third tension, gender role expectations and dominant ideology around what constitutes a 'good' mother were in conflict with physical activity and other types of self-care. Women commonly held the belief that a good mother only focuses on the needs of her baby and family; her own needs no longer matter. Women's experiences showed how expectations in relation to the maternal role led a high sense of social role strain that negatively impacted women's physical activity behaviour. These lived experiences also showed that maternal role expectations can result in the perception of physical activity as a selfish action, which was shown to encumber physical activity. During pregnancy, this struggle was only important among multigravidas, while during the postnatal phase this was important among both primiparous and multiparous women. How active women were depended on their social network's beliefs and on their personal beliefs in relation to how a 'good' mother should behave as some women mentioned physical activity helped with being a good mother.

The fourth tension showed that first-time mothers struggled with the identity change related to new motherhood and how to find meaning in their identity as mother and full time home maker. Social expectations in relation to a maternal role fulfilment generated a paradox between the joy of having a new baby and the shock or grief of losing a pre-pregnancy identity. Some women experienced these identity changes as traumatic, while others felt sad and/or had a crisis of confidence. This struggle and negotiation of new identities was experienced as stressful and encumbered physical activity. However, some women transgressed the dominant ideology of having to give up one's pre-pregnancy

identity when becoming a mother by continuing their pre-pregnancy physical activity habits, showing the possibility for new mothers to reach a level of empowerment.

The fifth tension described women's expressed need to leave the house and the desire to breastfeed. Women in this study struggled to combine the two, due to feelings of discomfort and embarrassment towards public breastfeeding. The perception of public breastfeeding as embarrassing and uncomfortable shows the lack of supportive social norms in relation to public breastfeeding, which had a negative impact on postnatal physical activity. Whether women breastfed in public or not appeared to be influenced by their own confidence in breaking a social rule.

10.4 Conclusions in Relation to the Final Research Question

Chapters 4, 5, 6, 7 and 8 provided the answer to the final research question: "What are the implications for intervention design in order to promote and sustain appropriate physical activity throughout the antenatal and postnatal phase?". These implications for future interventions have been described in Chapter 9, sections 9.2 and 9.3.

In summary, future interventions could benefit from considering women's life and physical activity changes during pregnancy and postpartum, including the reasons for such changes as these reasons or determinants provide opportunities for more effective intervention design. Chapters 4, 5 and 7 informed the fourth research question in terms of what determinants (see Tables 9.1 and 9.3) future interventions could address in order to promote and sustain appropriate physical activity throughout pregnancy and postpartum. Chapter 8 contributed to the fourth research question by describing how women give meaning to their physical activity experiences, including how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. This understanding was perceived as essential to provide meaningful suggestions for improving future intervention design that reflect understanding of women's perspectives and lived experiences. Intervention suggestions based on such understanding hold the potential to increase women's agency to exert more control over their physical activity choices, which can assist with increasing physical activity behaviour during pregnancy and postpartum. Table 9.4 presented key perspectives and

lived experiences of women in the longitudinal study in relation to what they valued during pregnancy and postpartum, what they valued about physical activity during this time and what types of support they would have needed to be able to engage in healthy levels of physical activity during pregnancy and postpartum. The findings of Chapter 8 and Chapter 6 also contributed to the fourth research question by highlighting which contextual issues interventions could consider. These have been described in Chapter 9, Table 9.2, and have been incorporated in section 9.3.

Future interventions may benefit from addressing the determinants that have shown to be important in relation to antenatal and postnatal physical activity (see Tables 9.1 and 9.3). Improving knowledge among health care providers and allied health professionals, pregnant and postnatal women, and the public can: reduce sickness, tiredness and physical discomfort during pregnancy, and assist in reducing the social stigma attached to pregnancy.

Women may also be more likely to engage in physical activity if they receive advice and support on how to find a healthy balance between self-care and care for others. Assisting women in this is a complex issue that needs further investigation. However, the longitudinal study and the literature review found four key issues of importance in increasing the likelihood of mothers engaging in leisure-time physical activity as a type of self-care: 1) addressing the restrictive definition of a 'good' mother, 2) increasing physical activity enjoyment, 3) preparing women for the struggles ahead, 4) increasing social support. In addition, it is important to assist women in developing and self-regulating a physical activity routine, and to provide advice on how to overcome barriers to physical activity.

Opportunities for inter-women communication could be created to increase self-organised physical activity companionship. In addition, sustainable, local and low cost exercise groups for pregnant women and women with babies are also believed to improve physical activity among pregnant and postnatal women. This is also interlinked with improving social capital, as improving social networks within communities increases the likelihood for women to engage in conversation and form new friendships, which may

facilitate physical activity through increased opportunities for physical activity companionship.

Improving postnatal contact with health professionals was also addressed as a strategy to facilitate physical activity among mothers. Improvement in partner support and communication about division of leisure time can be supported by health care providers and allied health professionals. In addition, the promotion of and potential improvement to existing policies in terms of maternal and paternal leave and childcare benefits can reduce social role strain, improve possibilities for partner involvement and support, and improve opportunities for self-care, which have been shown to facilitate physical activity among women.

Future physical activity interventions among postnatal women could benefit from including strategies that provide women with information on indoor activities they can enjoy with and without their baby. However, for women who want to leave the house, but feel restricted by the dominant ideology of having to breastfeed at home, strategies that focus on improving social attitudes towards public breastfeeding may be more helpful in establishing an active lifestyle. In order to increase physical activity outside the domestic space, future interventions may benefit from focusing on changing social norms towards breastfeeding in public, on increasing confidence in women to breastfeed in public, and on providing public facilities for breastfeeding. However, an increase in breastfeeding facilities may work counter-productively in terms of generating positive attitudes towards public breastfeeding. More research is therefore required.

Finally, improving the physical environment by improving traffic safety, aesthetics and walkability is believed to increase physical activity among pregnant women and mothers.

10.5 Contribution to the Literature

No published, peer-reviewed study was identified in the reviewed literature that explored the determinants of physical activity throughout pregnancy and the first three postnatal months. This longitudinal study therefore contributes to the current understanding of women's lives and physical activity behaviour; and how they give meaning to their

physical activity experiences in daily life throughout pregnancy and the postnatal period, including how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. The following sections discuss contextual contributions and findings related to determinants of antenatal and postnatal physical activity behaviour that have been identified as novel or confirmed limited existing evidence.

10.5.1 Contextual Contribution

The literature review did not locate any peer-reviewed, published studies on the Sunshine Coast or any other coastal or hinterland region in Queensland that investigated women's life and physical activity experiences, and determinants of physical activity behaviour during pregnancy and the postnatal period. The longitudinal study therefore contributes by extending the current literature to Queensland, taking into account contextual features such as climate and location, which were significant for this study.

The longitudinal study also provides an in-depth understanding of how women's lives and physical activity habits change throughout pregnancy and the first three postnatal months. The existing literature addressed physical changes and physical activity changes during pregnancy and postpartum. Previous studies have investigated the physical experience of pregnancy, including social constructions of the pregnant body,^{362,363} and the social experience of motherhood.^{149, 150, 364-368} However, Smith's³⁵⁸ research was the only study located within the reviewed literature that described life changes throughout pregnancy and during the transition to (new) motherhood. The longitudinal study therefore adds to the understanding of women's lives during pregnancy and postpartum. These life changes improve our understanding of pregnant and postnatal women's lived experiences and ways of thinking, which provides opportunities for future interventions. For example, first-time mothers commonly experienced a loss of control over their life in the postnatal phase, described as a temporary state of psychological decompensation, which resulted in a lack of self-care, including physical activity. This provides an opportunity for future interventions as improved postnatal contact with health professionals may result in an increased sense of control.

Another opportunity was identified in the first trimester; a trimester that was characterised by making financial and other arrangements. While women are in that 'planning mode', the first trimester could be an opportune time to assist women with establishing a self-care and physical activity plan for their remaining pregnancy and for postpartum, especially since most women did not feel well enough to be active until the second trimester. Other opportunities that flowed from this understanding of women's life changes have been discussed in Chapter 9, section 9.2.

In addition, the feminist lens contributed to the current understanding of women's physical activity behaviour during pregnancy and postpartum. The findings provided information on how women give meaning to their physical activity experiences and how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. Only three studies^{111, 112, 238} have been identified that investigated the meaning of physical activity for women and the tensions women experience in relation to physical activity, which have been discussed previously. Yarwood²³⁸ focused on midlife women, Nash¹¹¹ focused on pregnant women, while Lewis and Ridge¹¹² focused on mothers with children under school age. The feminist analysis within the longitudinal study strengthened the determinant analysis by revealing the deeper social structures around physical activity, pregnancy and motherhood. The feminist analysis contributed to context by revealing the complexity and socially situatedness of antenatal and postnatal physical activity. The feminist analysis therefore contributes to the current understanding of women's physical activity behaviour during pregnancy and postpartum. More details about the findings have been discussed in Chapter 8, and the contribution of these findings to the existing literature is highlighted in sections 10.5.2, 10.5.3 and 10.6.

10.5.2 Novel Themes and Novel Findings within Existing Themes

The literature review did not locate any published, peer-reviewed studies that acknowledged the stigmatisation of pregnancy as a barrier to physical activity. The feminist analysis therefore provides a novel contribution to the understanding of women's physical activity behaviour during pregnancy.

Another novel theme was public breastfeeding as a determinant of postnatal physical activity behaviour. Home-based breastfeeding was found to reduce physical activity opportunities during the postnatal period. Promoting public breastfeeding and addressing negative societal attitudes towards public breastfeeding could increase postnatal women's physical activity behaviour.

In addition, the finding that a lack of postnatal contact encumbered postnatal physical activity can also be identified as a relatively new finding. Mothers, both primigravidas and multigravidas, mentioned that due to the absence of home visits, the postnatal phase was a very stressful period, which made sufficient physical activity and self-care the least of their worries.

Another relatively novel finding was the discovery of psychological decompensation as a barrier to physical activity during the postnatal period. First-time mothers commonly mentioned going through a phase where they felt they had lost control over life and some women mentioned having experienced an emotional breakdown. This seems to have reduced women's physical activity behaviour and other forms of self-care.

No published, peer-reviewed studies were identified within the reviewed literature that investigated the association between social capital and postnatal physical activity behaviour. The findings of the longitudinal study speculate that postnatal women who felt a sense of community, a high level of community connectedness and knew a lot of people in their neighbourhood, were more likely engage in more outdoor activities, especially walking.

10.5.3 Contribution to Limited Existing Evidence

This section discusses the findings of the longitudinal study that contributed to or questioned limited existing evidence in relation to the determinants of women's physical activity behaviour during the first, second and third trimester of pregnancy, and/or the first three postnatal months.

In relation to individual level determinants, the longitudinal study confirmed existing evidence indicating that overall attitude towards physical activity did not seem to influence women's physical activity behaviour. However, this study added to the understanding of women's physical activity behaviour by specifying which behavioural beliefs did appear to be important in terms of antenatal and postpartum physical activity. The following beliefs were more likely to be reported by insufficiently active women: 1) Physical activity is a chore, 2) Moderate intensity exercise can cause a miscarriage or premature birth, 3) Fulfilling personal needs instead of the needs of others is selfish during motherhood, 4) I do not have time to be active. The following beliefs were more likely to be mentioned by sufficiently active women: 1) I owe it to my baby and children to be active and look after myself, and 2) Physical activity enables me to be a better mother, because I feel less stressed and revitalised after.

Based on the existing literature (see Chapter 4, section 4.1.2), intention was expected to be an important determinant of women's physical activity behaviour. However, this did not seem to be an important determinant of physical activity during the first or third trimester of pregnancy, or during the first three postnatal months. Most women had the intention of being more active, yet other factors prevented them (e.g., other responsibilities, nausea, tiredness and physical discomfort). Intention seems to be more important during the second trimester; however findings were not convincing enough to make any final conclusions.

In regard to the social environment, the longitudinal study indicated that although informational support on postnatal physical activity guidelines was not important, providing information on the benefits of physical activity in terms of improved maternal coping skills and family wellbeing was an important facilitator of postnatal physical activity. In addition, findings showed that informational support may be of more value to women if such information is received during the third trimester and after the first few postnatal weeks (in addition to the information provided at the hospital after childbirth). Receiving an overload of information directly after childbirth resulted in women failing to remember and implement the information provided via advice or printed materials.

In relation to costs of exercise facilities, the longitudinal study indicated that whether costs were perceived as a barrier to physical activity depended on whether women perceived physical activity as a priority and the physical activity friendliness of their neighbourhood. This can be viewed as an important notion for future intervention design. The findings of the feminist analysis also contribute to the current understanding of how the social environment influences women's physical activity behaviour during pregnancy and postpartum. Chapter 8 described how social expectations around how women 'should' behave during pregnancy and postpartum influenced women's physical activity behaviour. Many multigravidas and postpartum women felt they had to conform to the 'good' mother definition, which restricts leisure-time physical activity or other forms of self-care. The current definition of a good mother resulted in disempowering gender role expectations and social role strain, which encumbered physical activity. However, the findings also showed resistance, negotiation and transgressions of such social expectations around maternal identity, which indicates women's potential to rewrite ideologies and identifies opportunities for change.

As no published, peer-reviewed study could be located within the reviewed literature that investigated the impact of the physical environment on physical activity behaviour after childbirth, the longitudinal study adds to the current understanding of women's physical activity behaviour postpartum. The longitudinal study also contributes to the existing literature by revealing walkability as an important facilitator of physical activity throughout pregnancy and postpartum. The walkability of their neighbourhood was important among multigravidas during the first and second trimester, and for both multigravidas and primigravidas during the third trimester and postpartum. It appeared that during the first and second trimester, the proximity of shops, cafés and other facilities (= neighbourhood's walkability) were more appreciated by multigravidas.

The longitudinal study also adds that the availability of indoor exercise facilities and exercise classes were only important enablers of physical activity if women were living in physically unfriendly neighbourhoods. Postpartum, exercise classes had to be mother and baby classes as women did not want to put their baby into childcare during this period.

The longitudinal study furthermore clarified that neighbourhood safety in terms of traffic safety can be an important determinant of physical activity during the third trimester and postpartum, when women felt more vulnerable. In regard to the first and second trimester, traffic safety only appeared to be an important determinant among multigravidas as they often mentioned safety was more of an issue when walking with a stroller or being active outdoors with young children.

10.6 Contribution to Intervention Design

The intervention suggestions were derived from the literature review, intervention review and the longitudinal study. The variety of sources demonstrates that the intervention suggestions were based on extensive evidence. Previous interventions that were identified as effective in increasing physical activity behaviour among pregnant or postnatal women have been conducted in the United States, Hawaii, Canada, Finland and Iran.^{283, 330, 334, 336, 344, 345} The intervention review did not locate any published, peer-reviewed studies in Australia that were effective in increasing women's physical activity behaviour during pregnancy or postpartum. The intervention suggestions, outlined in Chapter 9, therefore contribute to future physical activity intervention design for pregnant and postnatal women within Australia.

Previous interventions have addressed some of the important determinants of physical activity, however the ways in which to address these determinants could be improved. In addition, the intervention review showed that many interventions were not sensitised to women's perspectives and lived experiences. The findings of the socio-ecological analysis within the longitudinal study showed which individual and social determinants have the highest potential to increase physical activity during pregnancy and postpartum, and also showed how these determinants could be addressed. The findings of this analysis also showed which determinants within the physical environment are important to address and how these could be addressed to facilitate physical activity among pregnant and postnatal women on the Sunshine Coast and similar areas in Queensland. The feminist analysis, provided useful information that adds to the current understanding of how societal attitudes towards physical activity, pregnancy and motherhood can influence women's physical activity behaviour during pregnancy and postpartum, and how these

insights provide opportunities for change. In addition, Table 9.4 summarised women's key perspectives related to physical activity during pregnancy and postpartum. This table could inform health promotion professionals and physical activity advocates such as primary health care providers, physiotherapists and fitness professionals. The guideline (see Table 9.5) developed for the media, health and fitness professionals can also be viewed as a contribution to future intervention design. This guideline can be used to inform pregnant and postnatal women, and the general public about the benefits and other matters related to physical activity throughout pregnancy and postpartum. However, this table only provides a general guideline and therefore does not include specific information on antenatal and postnatal physical activity guidelines or benefits. Tables 1.1-1.6, and Appendix 1 can be used by health care providers and allied health professionals to provide further information.

It can also be concluded that the main differences between the findings of the Sunshine Coast based longitudinal study and the results from the intervention review and the literature review on the determinants of physical activity among women, include issues related to cultural norms and the physical environment. Although some participants in the longitudinal study came from Japan, England and New Zealand, the majority was born in Australia. It must therefore be noted that when aiming to increase physical activity behaviour among diverse ethnicities, these intervention suggestions should be applied with caution. Intervention researchers have highlighted that no single approach applies to all ethnic groups and that interventions should therefore focus on one ethnic group or tailor the intervention to meet the variety of needs.⁴⁶⁹ It can therefore be concluded that the implications for intervention design made a novel contribution not only to future intervention design on the Sunshine Coast, but may also contribute to similar areas (in regard to cultural norms and the physical environment) in the world.

10.7 Unanswered Questions and Future Research Suggestions

This section discusses future research suggestions based on questions that were left unanswered after the literature review, intervention review and longitudinal study. Current knowledge regarding the effect of mothers' physical activity behaviour on personal and family wellbeing was limited. Future qualitative and quantitative research

therefore needs to examine the following relationships: physical activity and women's psychological and social wellbeing during pregnancy and postpartum; women's and family's wellbeing; women's wellbeing, and family and child functioning. The following sections discuss suggestions related to future determinant analyses and intervention research.

10.7.1 Future Determinant Analyses

Now a number of potential barriers and facilitators of physical activity behaviour among pregnant and postnatal women on the Sunshine Coast have been identified, including possible causal explanations, it is important to strengthen these findings via quantitative research. Quantitative research can point out which causal explanations are significant, which can further inform determinant analysis and intervention design. It is also important to find out how significant the interaction and inter-modification between barriers and facilitators of women's physical activity behaviour are, as it has been suggested that nausea, tiredness and other discomforts can reduce physical activity motivation, self-efficacy and priority. More quantitative research is needed on the important determinants of antenatal and postnatal physical activity addressed at an individual, social and physical environmental level.

Additional research is also needed to further qualitatively investigate the experience of guilt and perceived selfishness among multigravidas and postnatal women and how this influences physical activity behaviour, so that solutions may be uncovered. In relation to social norms, further qualitative research is needed on the ways in which social stigma influences women's physical activity behaviour during pregnancy. Further qualitative research is also needed to explore whether and how breastfeeding practices influence women's physical activity behaviour during early motherhood.

Previous findings suggest that health care providers and allied health professionals can have a significant influence on women's physical activity behaviour during pregnancy and postpartum. It could therefore be beneficial to further investigate the influence of health care providers and allied health professionals on women's physical activity behaviour

during pregnancy and postpartum, and investigate which factors facilitate or encumber physical activity advice from health and fitness professionals.

In terms of social capital, future research could explore and measure the influence of various characteristics of social capital (i.e., interpersonal trust between citizens, norms of reciprocity and sense of community) on women's physical activity behaviour during pregnancy and motherhood.

10.7.2 Future Intervention Research

All suggestions for future interventions discussed in Chapter 9 require further investigation. These suggestions relate to the individual, social or physical environmental level. Unanswered research questions were therefore categorised in one these three groups and are discussed in the following sections.

10.7.2.1 Future Research Suggestions related to Individual Level Strategies

In relation to the individual level, further research is required on the ways in which awareness and knowledge in relation to pregnancy and postpartum physical activity guidelines and benefits can best be increased among pregnant and postnatal women, health care providers and allied health professionals, and the general public. Further research is also needed on the ways in which to increase barrier-self-efficacy and self-regulatory efficacy in relation to physical activity during pregnancy and postpartum. More importantly, women have the potential to rewrite ideologies⁴⁷⁰ around physical activity, pregnancy and motherhood by challenging such ideas, attitudes and viewpoints through the mobilisation of alternative or counter perspectives that position them in more powerful ways, which in turn opens up possibilities for positive action and social change.^{471, 472} In line with previous feminist theoretical discussions,^{473, 474} the findings of the feminist analysis have showed that women are not simply positioned by existing ideologies but can position themselves within these, variably taking these up, resisting, negotiating, transgressing and tailoring them to achieve a desired identity. Future intervention research should further investigate how women can be empowered to be

able to achieve an identity that allows – **not prescribes** – them to engage in sufficient physical activity to achieve health benefits.

10.7.2.2 Future Research Suggestions related to Social Environmental Level Strategies

The findings of this research project showed how the social environment influenced women's physical activity behaviour during pregnancy and postpartum. Research is required on how to reduce the social stigmatisation of pregnancy as it appeared to have a negative influence on women's physical activity behaviour. Further research is also needed on how to promote public breastfeeding, however after more research is conducted on how breastfeeding practices influence women's physical activity behaviour postpartum.

In addition, more research on strategies that can assist with establishing a healthy balance between self-care and care for others could improve future physical activity interventions. This also requires further research on the ways in which to increase partner involvement and support for physical activity and how to increase social support for physical activity among single antenatal and postnatal women. It is also important to acknowledge the inevitable interrelationships between motherhood and fatherhood. Future research therefore needs to analyse both motherhood and fatherhood together as each category draws at least part of its meaning from opposition against as well as alignment with the other.⁴⁷⁵

Another issue that needs further investigation is how to increase awareness of the physical activity limiting role that the current definition of a 'good' mother(-to-be) plays, so that women can negotiate this dominant definition and transform its meaning to something that allows women to engage in physical activity more freely. Kaplan⁴⁷⁶ argued that only when a woman is perceived as a 'mother' when interacting with her child and 'mother' is no longer a fixed, essentialised quality, then women may be freed from these related constraints and burdens. As pointed out in the previous section, research is needed to find out ways in which women can be empowered to have an active role in shifting this thinking (around 'good mothering') among themselves and the wider

community as women in this study indicated that such a shift was needed for them to engage in sufficient self-care such as physical activity.

In relation to improving inter-women communication, research is required on how to stimulate communication between women in a way that increases physical activity and stimulates the formation of physical activity companionship. Focus groups with women can assist in establishing effective strategies to stimulate this.

In relation to improving postnatal contact with health professionals and support from the government, further research is required on how to improve postnatal contact in order to increase physical activity postpartum. Further research is also needed to identify the gaps in knowledge among health and fitness professionals in relation to antenatal and postnatal physical activity guidelines, and to find out the ways in which to improve physical activity advice. This includes further investigation of ways in which to improve workforce development in order to assist health care providers and allied health professionals in developing up to date knowledge and skills to provide their patients or clients with comprehensive and consistent advice in relation to antenatal and postnatal physical activity that reflects understanding of women's perspectives and lived experiences during these life phases.

In addition, more research is required on the ways in which social capital and social cohesion influence women's physical activity behaviour during pregnancy and postpartum, and how to build social capital in a way that facilitates physical activity during and beyond this life phase. In relation to developing new partnerships (see Chapter 9, section 9.4), further investigation is required on ways in which to establish such partnerships and how to ensure effective collaboration to increase physical activity levels among pregnant women and mothers. Effective advocacy strategies need to be identified in order to raise awareness and establish collaboration to meet the needs of pregnant women and mothers with young infants in order to increase physical activity during pregnancy, postpartum, and beyond these life phases. This includes collaboration with pregnant women and mothers to ensure actions are sensitive to women's perspectives and lived experiences, and to move from current approaches that are expert

driven¹¹² – and therefore prescriptive – towards approaches that empower women to take action towards improving their own wellbeing in ways they value.

10.7.2.3 Future Research Suggestions related to Physical Environmental Level Strategies

Further intervention research is required in relation to physical environmental strategies. More understanding is needed of how to organise new or subsidise existing exercise classes in order to establish affordable pregnancy exercise classes and mother and baby classes. It also needs to be investigated whether it is effective and cost-efficient to organise childcare for children of multigravida women at the same facility as their exercise class. Since costs and availability of classes was only an important determinant of physical activity behaviour in physical activity unfriendly neighbourhoods, further investigation is needed to clarify the ways in which environmental aesthetics, walkability and traffic safety can best be improved to increase physical activity behaviour among pregnant women and mothers.

10.8 Why Take Action Now? Consequences of Current Trend

Insufficient physical activity for health benefits among pregnant women and mothers is a worldwide issue. If this issue is not attended to as an urgent matter, this may continue to have a negative effect on the physical health of mother and child,⁵⁰ as well as the psychological and social aspects of wellbeing among mothers and families.⁵¹ Recent media statements by Queensland Health addressed the importance of achieving a healthy balance in life⁴⁷⁷ and research findings also indicated that “walking and talking” is the best medicine among women in terms of physical and mental wellbeing.⁴⁷⁸ In addition, the recent Queensland health media release “get out and play this father’s day” indicated the importance of family physical activity.⁴⁷⁹

Failing to address insufficient physical activity among pregnant women and mothers is also likely to continue to negatively impact the large and ever-increasing burden on the healthcare system and economy.¹⁰⁶ Worldwide, now is the time to build on existing and

form new partnerships on all levels. Queensland could benefit from partnerships between the government (national, state and local council), Queensland Health, universities, antenatal clinics, general practices, and fitness professionals. Responsibility has to be taken in order to put a stop to this negative development. Intervention strategies need to be implemented in order to continue the type of established collaboration during programs such as “Be-active Queensland 2006-2010”.

This dissertation has provided insights on the issues that prevent pregnant and postnatal women from engaging in sufficient physical activity. The results of the determinant analysis – based on the findings of the longitudinal study, the intervention review and the literature review – highlighted the important individual, social and physical environmental determinants of physical activity during pregnancy and postpartum. The feminist analysis strengthened the determinant analysis by providing insights on how women may give meaning to their physical activity experiences, including how these meanings relate to and are shaped by dominant ideology around physical activity, pregnancy and motherhood. The findings of the determinant analysis, feminist analysis and women’s own ideas for future physical activity programs have been used to develop intervention suggestions that have the potential to improve future intervention design to increase physical activity and improve physical and mental health among mothers(-to-be) and their families.

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APPENDIX 1. Physical Activity Readiness Medical Examination

Physical Activity Readiness
Medical Examination for
Pregnancy (2002)

PARmed-X for PREGNANCY **PHYSICAL ACTIVITY READINESS MEDICAL EXAMINATION**

PARmed-X for PREGNANCY is a guideline for health screening prior to participation in a prenatal fitness class or other exercise.

Healthy women with uncomplicated pregnancies can integrate physical activity into their daily living and can participate without significant risks either to themselves or to their unborn child. Postulated benefits of such programs include improved aerobic and muscular fitness, promotion of appropriate weight gain, and facilitation of labour. Regular exercise may also help to prevent gestational glucose intolerance and pregnancy-induced hypertension.

The safety of prenatal exercise programs depends on an adequate level of maternal-fetal physiological reserve. PARmed-X for PREGNANCY is a convenient checklist and prescription for use by health care providers to evaluate pregnant patients who want to enter a prenatal fitness program and for ongoing medical surveillance of exercising pregnant patients.

Instructions for use of the 4-page PARmed-X for PREGNANCY are the following:

1. The patient should fill out the section on PATIENT INFORMATION and the PRE-EXERCISE HEALTH CHECKLIST (PART 1, 2, 3, and 4 on p. 1) and give the form to the health care provider monitoring her pregnancy.
2. The health care provider should check the information provided by the patient for accuracy and fill out SECTION C on CONTRAINDICATIONS (p. 2) based on current medical information.
3. If no exercise contraindications exist, the HEALTH EVALUATION FORM (p. 3) should be completed, signed by the health care provider, and given by the patient to her prenatal fitness professional.

In addition to prudent medical care, participation in appropriate types, intensities and amounts of exercise is recommended to increase the likelihood of a beneficial pregnancy outcome. PARmed-X for PREGNANCY provides recommendations for individualized exercise prescription (p. 3) and program safety (p. 4).

NOTE: Sections A and B should be completed by the patient before the appointment with the health care provider.

<h3 style="margin: 0;">A PATIENT INFORMATION</h3> <p>NAME _____</p> <p>ADDRESS _____</p> <p>TELEPHONE _____ BIRTHDATE _____ HEALTH INSURANCE No. _____</p> <p>NAME OF PRENATAL FITNESS PROFESSIONAL _____ PRENATAL FITNESS PROFESSIONAL'S PHONE NUMBER _____</p>																																																																																																		
<h3 style="margin: 0;">B PRE-EXERCISE HEALTH CHECKLIST</h3> <h4 style="margin: 0;">PART 1: GENERAL HEALTH STATUS</h4> <p>In the past, have you experienced (check YES or NO):</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%; text-align: center;">YES</th> <th style="width: 10%; text-align: center;">NO</th> </tr> </thead> <tbody> <tr> <td>1. Miscarriage in an earlier pregnancy?</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>2. Other pregnancy complications?</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>3. I have completed a PAR-Q within the last 30 days.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table> <p>If you answered YES to question 1 or 2, please explain:</p> <p>_____</p> <p>Number of previous pregnancies? _____</p> <h4 style="margin: 0;">PART 2: STATUS OF CURRENT PREGNANCY</h4> <p>Due Date: _____</p> <p>During this pregnancy, have you experienced:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%; text-align: center;">YES</th> <th style="width: 10%; text-align: center;">NO</th> </tr> </thead> <tbody> <tr> <td>1. Marked fatigue?</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>2. 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List only regular fitness/recreational activities:</p> <p>_____</p> <table style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2" style="width: 20%;">INTENSITY</th> <th colspan="3" style="text-align: center;">FREQUENCY (times/week)</th> <th colspan="3" style="text-align: center;">TIME (minutes/day)</th> </tr> <tr> <th style="text-align: center;">1-2</th> <th style="text-align: center;">2-4</th> <th style="text-align: center;">4+</th> <th style="text-align: center;"><20</th> <th style="text-align: center;">20-40</th> <th style="text-align: center;">40+</th> </tr> </thead> <tbody> <tr> <td>Heavy</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Medium</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Light</td> <td style="text-align: center;">_____</td> </tr> </tbody> </table> <p>2. 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Do you consume alcohol? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <h4 style="margin: 0;">PART 4: PHYSICAL ACTIVITY INTENTIONS</h4> <p>What physical activity do you intend to do?</p> <p>_____</p> <p>Is this a change from what you currently do? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; text-align: center;"> <p>*NOTE: PREGNANT WOMEN ARE STRONGLY ADVISED NOT TO SMOKE OR CONSUME ALCOHOL DURING PREGNANCY AND DURING LACTATION.</p> </div>	INTENSITY	FREQUENCY (times/week)			TIME (minutes/day)			1-2	2-4	4+	<20	20-40	40+	Heavy	_____	_____	_____	_____	_____	_____	Medium	_____	_____	_____	_____	_____	_____	Light	_____	_____	_____	_____	_____	_____		YES	NO	Heavy Lifting?	<input type="checkbox"/>	<input type="checkbox"/>	Frequent walking/stair climbing?	<input type="checkbox"/>	<input type="checkbox"/>	Occasional walking (>once/hr)?	<input type="checkbox"/>	<input type="checkbox"/>	Prolonged standing?	<input type="checkbox"/>	<input type="checkbox"/>	Mainly sitting?	<input type="checkbox"/>	<input type="checkbox"/>	Normal daily activity?	<input type="checkbox"/>	<input type="checkbox"/>
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Société canadienne de physiologie de l'exercice

Supported by: Health Canada Santé Canada

PARmed-X for PREGNANCY PHYSICAL ACTIVITY READINESS MEDICAL EXAMINATION

C CONTRAINDICATIONS TO EXERCISE: to be completed by your health care provider					
Absolute Contraindications			Relative Contraindications		
<i>Does the patient have:</i>			<i>Does the patient have:</i>		
	YES	NO		YES	NO
1. Ruptured membranes, premature labour?	<input type="checkbox"/>	<input type="checkbox"/>	1. History of spontaneous abortion or premature labour in previous pregnancies?	<input type="checkbox"/>	<input type="checkbox"/>
2. Persistent second or third trimester bleeding/placenta previa?	<input type="checkbox"/>	<input type="checkbox"/>	2. Mild/moderate cardiovascular or respiratory disease (e.g., chronic hypertension, asthma)?	<input type="checkbox"/>	<input type="checkbox"/>
3. Pregnancy-induced hypertension or pre-eclampsia?	<input type="checkbox"/>	<input type="checkbox"/>	3. Anemia or iron deficiency? (Hb < 100 g/L)?	<input type="checkbox"/>	<input type="checkbox"/>
4. Incompetent cervix?	<input type="checkbox"/>	<input type="checkbox"/>	4. Malnutrition or eating disorder (anorexia, bulimia)?	<input type="checkbox"/>	<input type="checkbox"/>
5. Evidence of intrauterine growth restriction?	<input type="checkbox"/>	<input type="checkbox"/>	5. Twin pregnancy after 28th week?	<input type="checkbox"/>	<input type="checkbox"/>
6. High-order pregnancy (e.g., triplets)?	<input type="checkbox"/>	<input type="checkbox"/>	6. Other significant medical condition?	<input type="checkbox"/>	<input type="checkbox"/>
7. Uncontrolled Type I diabetes, hypertension or thyroid disease, other serious cardiovascular, respiratory or systemic disorder?	<input type="checkbox"/>	<input type="checkbox"/>	Please specify: _____		
NOTE: Risk may exceed benefits of regular physical activity. The decision to be physically active or not should be made with qualified medical advice.					
PHYSICAL ACTIVITY RECOMMENDATION:			<input type="checkbox"/> Recommended/Approved <input type="checkbox"/> Contraindicated		

Prescription for Aerobic Activity

RATE OF PROGRESSION: The best time to progress is during the second trimester since risks and discomforts of pregnancy are lowest at that time. Aerobic exercise should be increased gradually during the second trimester from a minimum of 15 minutes per session, 3 times per week (at the appropriate target heart rate or RPE) to a maximum of approximately 30 minutes per session, 4 times per week (at the appropriate target heart rate or RPE).

WARM-UP/COOL-DOWN: Aerobic activity should be preceded by a brief (10-15 min.) warm-up and followed by a short (10-15 min.) cool-down. Low intensity calisthenics, stretching and relaxation exercises should be included in the warm-up/cool-down.

PRESCRIPTION/MONITORING OF INTENSITY: The best way to prescribe and monitor exercise is by combining the heart rate and rating of perceived exertion (RPE) methods.

F	I	T	T
FREQUENCY	INTENSITY	TIME	TYPE
Begin at 3 times per week and progress to four times per week	Exercise within an appropriate RPE range and/or target heart rate zone	Attempt 15 minutes, even if it means reducing the intensity. Rest intervals may be helpful	Non weight-bearing or low-impact endurance exercise using large muscle groups (e.g., walking, stationary cycling, swimming, aquatic exercises, low impact aerobics)

TARGET HEART RATE ZONES	
The heart rate zones shown below are appropriate for most pregnant women. Work during the lower end of the HR range at the start of a new exercise program and in late pregnancy.	
Age	Heart Rate Range
< 20	140-155
20-29	135-150
30-39	130-145

RATING OF PERCEIVED EXERTION (RPE)	
Check the accuracy of your heart rate target zone by comparing it to the scale below. A range of about 12-14 (somewhat hard) is appropriate for most pregnant women.	
6	
7	Very, very light
8	
9	Somewhat light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard
20	

"TALK TEST" - A final check to avoid overexertion is to use the "talk test". The exercise intensity is excessive if you cannot carry on a verbal conversation while exercising.

The original PARmed-X for PREGNANCY was developed by L.A. Wolfe, Ph.D., Queen's University. The muscular conditioning component was developed by M.F. Mottola, Ph.D., University of Western Ontario. The document has been revised based on advice from an Expert Advisory Committee of the Canadian Society for Exercise Physiology chaired by Dr. N. Gledhill, with additional input from Drs. Wolfe and Mottola, and Gregory A.L. Davies, M.D., FRCS(C) Department of Obstetrics and Gynaecology, Queen's University, 2002.

No changes permitted. Translation and reproduction in its entirety is encouraged.

Disponible en français sous le titre «Examen médical sur l'aptitude à l'activité physique pour les femmes enceintes (X-AAP pour les femmes enceintes)»

Additional copies of the PARmed-X for PREGNANCY, the PARmed-X and/or the PAR-Q can be downloaded from: <http://www.csep.ca/forms.asp>
For more information contact the:

Canadian Society for Exercise Physiology
185 Somerset St. West, Suite 202, Ottawa, Ontario CANADA K2P 0J2
tel.: 1-877-651-3755 FAX (613) 234-3565 www.csep.ca

PARmed-X for PREGNANCY **PHYSICAL ACTIVITY READINESS MEDICAL EXAMINATION**

Prescription for Muscular Conditioning

It is important to condition all major muscle groups during both prenatal and postnatal periods.

WARM-UPS & COOL DOWN:
Range of Motion: neck, shoulder girdle, back, arms, hips, knees, ankles, etc.

Static Stretching: all major muscle groups

(DO NOT OVER STRETCH!)

EXAMPLES OF MUSCULAR STRENGTHENING EXERCISES		
CATEGORY	PURPOSE	EXAMPLE
Upper back	Promotion of good posture	Shoulder shrugs, shoulder blade pinch
Lower back	Promotion of good posture	Modified standing opposite leg & arm lifts
Abdomen	Promotion of good posture, prevent low-back pain, prevent diastasis recti, strengthen muscles of labour	Abdominal tightening, abdominal curl-ups, head raises lying on side or standing position
Pelvic floor ("Kegels")	Promotion of good bladder control, prevention of urinary incontinence	"Wave", "elevator"
Upper body	Improve muscular support for breasts	Shoulder rotations, modified push-ups against a wall
Buttocks, lower limbs	Facilitation of weight-bearing, prevention of varicose veins	Buttocks squeeze, standing leg lifts, heel raises

PRECAUTIONS FOR MUSCULAR CONDITIONING DURING PREGNANCY		
VARIABLE	EFFECTS OF PREGNANCY	EXERCISE MODIFICATIONS
Body Position	<ul style="list-style-type: none"> in the supine position (lying on the back), the enlarged uterus may either decrease the flow of blood returning from the lower half of the body as it presses on a major vein (inferior vena cava) or it may decrease flow to a major artery (abdominal aorta) 	<ul style="list-style-type: none"> past 4 months of gestation, exercises normally done in the supine position should be altered such exercises should be done side lying or standing
Joint Laxity	<ul style="list-style-type: none"> ligaments become relaxed due to increasing hormone levels joints may be prone to injury 	<ul style="list-style-type: none"> avoid rapid changes in direction and bouncing during exercises stretching should be performed with controlled movements
Abdominal Muscles	<ul style="list-style-type: none"> presence of a rippling (bulging) of connective tissue along the midline of the pregnant abdomen (diastasis recti) may be seen during abdominal exercise 	<ul style="list-style-type: none"> abdominal exercises are not recommended if diastasis recti develops
Posture	<ul style="list-style-type: none"> increasing weight of enlarged breasts and uterus may cause a forward shift in the centre of gravity and may increase the arch in the lower back this may also cause shoulders to slump forward 	<ul style="list-style-type: none"> emphasis on correct posture and neutral pelvic alignment. Neutral pelvic alignment is found by bending the knees, feet shoulder width apart, and aligning the pelvis between accentuated lordosis and the posterior pelvic tilt position.
Precautions for Resistance Exercise	<ul style="list-style-type: none"> emphasis must be placed on continuous breathing throughout exercise exhale on exertion, inhale on relaxation using high repetitions and low weights Valsalva Manoeuvre (holding breath while working against a resistance) causes a change in blood pressure and therefore should be avoided avoid exercise in supine position past 4 months gestation 	



PARmed-X for Pregnancy - Health Evaluation Form

(to be completed by patient and given to the prenatal fitness professional after obtaining medical clearance to exercise)

I, _____ PLEASE PRINT (patient's name), have discussed my plans to participate in physical activity during my current pregnancy with my health care provider and I have obtained his/her approval to begin participation.

Signed: _____
(patient's signature)

Date: _____

HEALTH CARE PROVIDER'S COMMENTS:

Name of health care provider: _____

Address: _____

Telephone: _____

(health care provider's signature)

Advice for Active Living During Pregnancy

Pregnancy is a time when women can make beneficial changes in their health habits to protect and promote the healthy development of their unborn babies. These changes include adopting improved eating habits, abstinence from smoking and alcohol intake, and participating in regular moderate physical activity. Since all of these changes can be carried over into the postnatal period and beyond, pregnancy is a very good time to adopt healthy lifestyle habits that are permanent by integrating physical activity with enjoyable healthy eating and a positive self and body image.

Active Living:

- see your doctor before increasing your activity level during pregnancy
- exercise regularly but don't overexert
- exercise with a pregnant friend or join a prenatal exercise program
- follow FITT principles modified for pregnant women
- know safety considerations for exercise in pregnancy

Healthy Eating:

- the need for calories is higher (about 300 more per day) than before pregnancy
- follow Canada's Food Guide to Healthy Eating and choose healthy foods from the following groups: whole grain or enriched bread or cereal, fruits and vegetables, milk and milk products, meat, fish, poultry and alternatives
- drink 6-8 glasses of fluid, including water, each day
- salt intake should not be restricted
- limit caffeine intake i.e., coffee, tea, chocolate, and cola drinks
- dieting to lose weight is not recommended during pregnancy

Positive Self and Body Image:

- remember that it is normal to gain weight during pregnancy
- accept that your body shape will change during pregnancy
- enjoy your pregnancy as a unique and meaningful experience

For more detailed information and advice about pre- and postnatal exercise, you may wish to obtain a copy of a booklet entitled *Active Living During Pregnancy: Physical Activity Guidelines for Mother and Baby* © 1999. Available from the Canadian Society for Exercise Physiology, 185 Somerset St. West, Suite 202, Ottawa, Ontario Canada K2P 0J2 Tel. 1-877-651-3755 Fax: (613) 234-3565 Email: info@csep.ca (online: www.csep.ca). Cost: \$11.95

For more detailed information about the safety of exercise in pregnancy you may wish to obtain a copy of the Clinical Practice Guidelines of the Society of Obstetricians and Gynaecologists of Canada and Canadian Society for Exercise Physiology entitled *Exercise in Pregnancy and Postpartum* © 2003. Available from the Society of Obstetricians and Gynaecologists of Canada online at www.sogc.org

For more detailed information about pregnancy and childbirth you may wish to obtain a copy of *Healthy Beginnings: Your Handbook for Pregnancy and Birth* © 1998. Available from the Society of Obstetricians and Gynaecologists of Canada at 1-877-519-7999 (also available online at www.sogc.org) Cost \$12.95.

For more detailed information on healthy eating during pregnancy, you may wish to obtain a copy of *Nutrition for a Healthy Pregnancy: National Guidelines for the Childbearing Years* © 1999. Available from Health Canada, Minister of Public Works and Government Services, Ottawa, Ontario Canada (also available online at www.hc-sc.gc.ca).

SAFETY CONSIDERATIONS

- ◆ Avoid exercise in warm/humid environments, especially during the 1st trimester
- ◆ Avoid isometric exercise or straining while holding your breath
- ◆ Maintain adequate nutrition and hydration — drink liquids before and after exercise
- ◆ Avoid exercise while lying on your back past the 4th month of pregnancy
- ◆ Avoid activities which involve physical contact or danger of falling
- ◆ Know your limits — pregnancy is not a good time to train for athletic competition
- ◆ Know the reasons to stop exercise and consult a qualified health care provider immediately if they occur

REASONS TO STOP EXERCISE AND CONSULT YOUR HEALTH CARE PROVIDER

- ◆ Excessive shortness of breath
- ◆ Chest pain
- ◆ Painful uterine contractions (more than 6-8 per hour)
- ◆ Vaginal bleeding
- ◆ Any “gush” of fluid from vagina (suggesting premature rupture of the membranes)
- ◆ Dizziness or faintness

APPENDIX 2. Literature Review Data Base Search

- PA/exercise/adherence
- Pregnant/antenatal women/pregnancy
- Mothers/postnatal women
- Women
- Individual factors
- Feminist/feminism
- Social ecological model
- Social environment or its subconcepts: social support, social inequality and/or neighbourhood and community characteristics
- Physical environment or built environment
- Theory of Planned Behaviour or its subconcepts: intention, attitude, (behavioural) beliefs, subjective norm, normative beliefs, perceived behavioural control
- The Social Cognitive Theory or its subconcepts: environment, situation, behavioural capability, expectations, expectancies, self-control, observational learning, reinforcements, self-efficacy, emotional coping response, reciprocal determinism)
- Transtheoretical model or its subconcepts: pros, cons and/or self-efficacy
- Health Belief Model or its subconcepts: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and/or self-efficacy

APPENDIX 3. Characteristics Intervention Studies

RCTs:

Reference	Participants	Objective	PA related Measures	Determinants addressed	PA related Results
Maturi et al ³³⁴	Postnatal women, no specific ethnicity	To evaluate the effect of PA intervention based on pedometer on PA level and anthropometric measures of women after childbirth	PA was measured via pedometers, International PA questionnaire and an average metabolic equivalent score was calculated for total PA performed per week	Self-regulatory efficacy, knowledge and informational support and emotional support	<p>After the 12 week study period, 65.6% of the women in the intervention group and only 32.5% of the women in the control group were performing vigorous PA ($p < 0.001$). Participants in the intervention group started with a mean of energy expenditure of 762.1 calorie per week and progressed to a mean of 4394.3 calorie by week 12 ($p < 0.001$). Participants in intervention group progressed significantly more than control group.</p> <p>The mean number of steps per day in the intervention group increased from 3246 till 9960 steps per day ($p < 0.001$) and 62.5% of participants were performing a sufficient level of PA in week 12.</p>
Cramp and Brawley ³²⁷	Low income, multiethnic women	To examine the effects of a group-mediated cognitive behavioural counselling plus exercise intervention	PA via the 7-day PA Recall	Self-regulatory efficacy, behavioural belief, social network	The Group Mediated Cognitive Behavioural Counselling Plus Exercise (GMCB) group reported significantly greater minutes of independent PA than the Standard Exercise (SE) group following the intensive phase of the intervention. GMCB participants also reported significantly greater minutes of independent, self-directed PA than the SE group following the home-based phase of the intervention.
Fjeldsoe et al ³²⁹	Mothers, no specific ethnicity	To evaluate the efficacy and feasibility of a theory-based PA	Number of days per week that participants reported at least 30 min of moderate-to-vigorous-	Self-regulatory efficacy, behavioural beliefs, emotional support, awareness/knowledge (opportunity for PA),	The difference between intervention and control group in terms of moderate-to-vigorous-intensity PA frequency was statistically significant between baseline and 6 weeks and between baseline and 13 weeks.

		intervention delivered to postnatal women primarily via mobile telephone short message service	intensity PA or walking for exercise and total duration (min/week) of moderate-to-vigorous-intensity PA and walking for exercise using the Australian Women's Activity Survey	informational support and social network	The between-groups difference in change in walking for exercise frequency was statistically significant between baseline and 6 weeks, but not between baseline and 13 weeks. No significant interaction effects (group × time) were observed for duration outcomes.
Chasan-Taber et al ³³⁶	Pregnant women, no specific ethnicity	To evaluate the feasibility and preliminary efficacy of a 12-week intervention to promote PA among a diverse sample of pregnant women at high risk for gestational diabetes mellitus	PA via the Pregnancy PA Questionnaire	Motivation, self-regulatory efficacy, barrier self-efficacy, knowledge and informational support and emotional support	Women in the exercise intervention arm experienced a smaller decrease in total activity as compared with women in the health and wellness contact control arm. More importantly, women in the exercise intervention experienced a significantly larger increase in sports/exercise as compared with women in the health and wellness arm who experienced a slight decrease.
Dunton and Robertson ³³²	multiethnic women	To evaluate the feasibility and efficacy of an individually tailored, Internet-plus-email PA intervention designed for adult women.	Frequency and duration of sport or exercise activities undertaken in the past two weeks, using a standardised activity inventory format	Motivation and self-efficacy	Across the whole intervention, walking increased at a faster rate in the intervention group than the control group at three months. After three months, the intervention group increased walking by 69 min per week as compared to the increase by 32 min per week observed in the control group. Multilevel modelling analyses found that there was a significant group difference in the rate of change in moderate-to-vigorous PA. Between baseline and the three months assessment, minutes per week of moderate-to-vigorous-intensity PA increased to a greater extent in the intervention group as compared to the control group

Fahrenwald et al¹²	Low income mothers	To pilot test "Moms on the Move," a Transtheoretical Model derived PA intervention for low-income mothers	PA behaviour was measured by the 7-day PA Recall	Motivation, self-efficacy, social support, awareness, knowledge and informational support	Results for each of the 7-day PA Recall indexes revealed significantly greater improvement in PA behaviour in the intervention group. The intervention group progressed in stage of change more than the control group. The intervention group had greater PA behaviour: weekly minutes of PA; daily energy expenditure; and weekly moderate PA. Intervention subgroup (n = 11) step counts sig increased pre-post, which was more than the control group.
Purath et al³³⁸	Working women	To determine whether a brief, tailored counselling intervention is effective for increasing PA in sedentary women when delivered in the workplace	<ul style="list-style-type: none"> • Stage of change • Flights of stairs/day, • Blocks walked/day, • Hours of vigorous and moderate weekday PA, • Hours of vigorous and moderate weekend PA, • Minutes walked to work/week, • Minutes walked on errands/week, • Minutes walked during lunch or breaks/week • Minutes walked for exercise/week • Total minutes walked/week 	self-regulatory efficacy, motivation and emotional support	Stage of change, minutes walked for exercise/week, Total minutes walked/week, hours of vigorous and moderate weekend PA, and blocks walked per day were significantly higher for the intervention group compared to the control group.
Speck et al³³¹	Women, no specific ethnicity or subgroup	To examine whether a minimal intervention (daily records of PA) increased activity levels in a community sample of working women.	PA via pedometer	Self-regulatory efficacy, barrier self-efficacy, outcome expectation, value expectation and social support (from family and friends)	At the end of the study, there was a statistically significant difference in pedometer values between the intervention and control groups after adjusting for the estimated intra-class correlation of 0.48. PA (MET-score) improved in the intervention group and declined in the control group, but the difference was not statistically significant.

Hui et al³⁴⁴	Urban-living pregnant women	To assess the efficacy of the lifestyle intervention on excessive gestational weight gain, food intake and PA in urban-living pregnant women through a randomised controlled trial	Recreational physical activities of all participants were semi-quantified using an activity questionnaire on a PA Readiness Medical Examination form for Pregnancy designed by CSEP.	Knowledge and informational support, self-regulatory efficacy, instrumental support and social network	At 2 months after the enrolment, the levels of PA index had increased significantly in the intervention group compared with baseline and had increased significantly more compared to the control group.
Aittasalo et al³⁴⁵	Pregnant and postpartum women	The purpose of the study is to examine the effects and feasibility of individual PA counselling in maternity and child health clinics in Finland.	Leisure-time PA prior to pregnancy was elicited by questionnaire and followed 16–18 and 36–37 weeks gestation in maternity clinics and 5 and 10 months postpartum in child health clinics	Knowledge and informational support, barrier self-efficacy, self-regulatory efficacy and social network	Among pregnant participants at the first follow-up there were no differences in Leisure-time PA between intervention and control group. At the second follow-up the weekly number of at least moderate-intensity leisure-time PA days was significantly higher and the weekly duration of at least moderate-intensity leisure-time PA was also significantly higher in intervention compared to control group. Conversely, the weekly number of light-intensity leisure-time PA days was significantly lower in intervention than control group. Among postpartum participants no group differences in leisure-time PA were discovered.
Albright et al³⁴⁰	Sedentary, low-income women participating in federally funded job training programs	This study aimed to increase adoption and maintenance of PA in sedentary, low-income women participating in federally funded	Pedometer, 7-day PA Recall + in order to check self-report accuracy, a few participants had to wear a biotrainer in order to track leg movements during the waking hours of 2 to 3 days. On these days, participants also had to	Knowledge and informational support, motivation, PA self-efficacy, barrier self-efficacy, self-regulatory efficacy and emotional support	At the 12-month assessment, the phone + mail counselling condition had maintained the initial increase in PA, whereas the mail support condition relapsed to a level comparable to or slightly below their baseline PA level. The difference between the two slopes was significant. However, at 12 months, the mean percentage between groups in relation to the percentage of participants

		job training programs.	keep a diary of their physical activities.		engaging in 30 min or more of moderate-to-vigorous-intensity PA at least 5 days a week, were not significantly different.
Stadler et al³²⁸	Women, no specific ethnicity, SES, etc.	To test whether an intervention that combined information with cognitive behavioural strategies had a better effect on women's PA than an information only intervention.	Self-reported minutes of moderate-to-vigorous-intensity PA per week	Self-regulatory efficacy, knowledge and informational support, and social network	Information + self-regulation group held their initial increase in PA immediately after the intervention over the following 4 months, whereas participants in the information group remained at their lower level over the course of the study

PA= Physical activity

Non-RCTs:

Reference	Participants	Objective	PA related Measures	Determinants addressed	PA related Results
Collins et al³³⁷	Low-income multiethnic women	To evaluate the effect of a pre-intervention PA preparatory course on PA, and social, cognitive, and transtheoretical constructs.	Self reported walking for exercise, Seven-Day PA Recall	Knowledge and informational support, motivation, PA self-efficacy, barrier self-efficacy, self-regulatory efficacy and social support	Significant increase in minutes of exercise: 45.02% increase
Urizar et al³³⁹	Low-income women participating in federally funded job-training programs	To determine whether certain maternal variables influenced successful participation in an 8-week, class-based, PA intervention	Seven-Day PA Recall, PA class attendance	Knowledge and informational support, motivation PA self-efficacy, barrier self-efficacy, self-regulatory efficacy and social support	Significant increase in energy expenditure as measured by the PA Recall, from baseline to 10 weeks. On average, participants attended six out of eight classes, with 75% attending five or more classes. Class attendance was significantly associated with increases in PA from baseline to 10 weeks among mothers with children from 0-11.

Wen et al²⁸⁸	Women, 20-50 years	To increase the PA levels of women aged 20-50 years living in the Concord Local Government Area	Self reported hours and numbers of sessions of walking, moderate activity, vigorous activity	Knowledge and informational support, motivation, barrier self-efficacy, PA beliefs, intention, social network and companionship	The study found a significant reduction in the proportion of women classified as sedentary at post-survey compared to pre-survey. There was also an increase in the proportion of women in the low activity category at post-survey compared to pre-survey. There were no significant changes in moderate and high physical activities between the pre- and post-surveys. There was a significant reduction in self-reported nil hours walked from 30.8% at post-survey compared to pre-survey.
Huberty et al³⁴³	Women, no specific ethnicity, SES, etc.	To determine the feasibility of an 8-month PA book club in increasing PA and self-worth among women.	Measure of PA via Pedometers, 7-Day PA Recall.	Knowledge and informational support, awareness, self-esteem, self-worth, self-regulatory efficacy and PA priority	Significant increase in steps per day as measured by pedometer and energy expenditure
Albright et al³³⁰	Multiethnic women	To test the efficacy of this intervention to increase minutes per week of moderate to vigorous leisure-time PA over two months	Respondents reported the number of days per week and min per day of moderate and vigorous leisure-time PA at three intensity levels: 1) strenuous or vigorous activity; 2) moderate activity; or 3) mild activity (which was measured in terms perceived effort and how much they were sweating)	Awareness raising (of exercise facilities and opportunities), self-efficacy, barrier self-efficacy, outcomes expectancy, motivation, self-regulatory efficacy and emotional support	At endpoint 30% of the women met or exceeded national recommendations for 150 minutes per week of moderate or greater intensity PA. Over half (55%) had increases of 60 minutes or more of moderate to vigorous leisure-time PA per week, with no significant difference between races
Clarke et al³⁴¹	Low-income mothers	To test the effectiveness of a pedometer program for increasing PA levels and reducing body weight in overweight and	PA via pedometer steps and kilocalories, stages of change	Exercise self-efficacy, motivation, knowledge and informational support, self-regulatory efficacy, emotional support and instrumental support	Pedometer steps and kilocalorie expenditure increased significantly by the end of the program. Mothers also progressed in terms of stages of change

		obese mothers of young children.			
Pal et al ³³⁵	Sedentary, overweight, middle aged women	This 12 week study evaluated whether a 10,000 steps per day message was more effective than a 30 minutes a day message in increasing PA in low active, overweight women.	PA via pedometer	Knowledge and informational support, self-regulatory efficacy and emotional support	The 10,000 step and the 30 minutes groups' daily average number of steps/day were significantly higher than baseline at week 6 and at week 12. At week 12, the 10,000 steps group were taking an average of 4616 steps per day more (43% increase) than at baseline and the 30 minutes group were taking an average of 2761 steps per day more (35% increase) than at baseline. There was a significant difference in the number of steps with the 10,000 steps group versus 30 minutes group at 12 weeks.
Segar et al ³³³	white, highly educated, middle-class women	to evaluate whether women who participated in the intervention would increase and maintain levels of PA after the intervention ended, and whether the intervention would increase participants taking a pleasure-based approach to PA and prioritising self-care behaviours.	Godin Leisure-Time Exercise Questionnaire	Behavioural beliefs, knowledge and informational support, barrier self-efficacy, self-regulatory efficacy, motivation, body image, self-esteem, self-worth, emotional support and social network	Light, moderate, vigorous and total PA sessions activity sessions significantly increased from baseline to follow-up.

PA= Physical activity

APPENDIX 4. Ethics Approval

Office of the Redcliffe-Caboolture Human Research Ethics Committee

19th October 2009

Enquiries to: Mark Zgrajewski

Phone: 07 38837851

Fax: 07 38837530

Our Ref: HREC/09/QNRC/55

E-mail RCHSD Ethics Committee
@health.qld.gov.au

Michelle Van Mulken
Unit 1, 11 Tarcoola Avenue
MOOLOOLABA QLD 4557

Dear Ms Van Mulken,

HREC Reference number: HREC/09/QNRC/55

Project title: *A qualitative investigation of the determinants of physical activity during and after pregnancy.*

Thank you for submitting the above project for ethical review. This project was first considered by the Redcliffe-Caboolture Human Research Ethics Committee (HREC) on 7th October 2009.

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007)*, *NHMRC and Universities Australia Australian Code for the Responsible Conduct of Research (2007)* and the *CPMP/ICH Note for Guidance on Good Clinical Practice*. Attached is the HREC Composition with specialty and affiliation with the Hospital (Attachment I).

I am pleased to advise that the Human Research Ethics Committee has granted approval of this research project. The documents reviewed and approved include:

<i>Document</i>	<i>Version</i>	<i>Date</i>	
Covering Letter		03 September 2009	
Master Participant Information Sheet: participant information		28 August 2009	
Master Consent Form: Consent form		28 August 2009	
Interview Schedules / Topic Guides: Interview guide of the first interview. Other interviews have the same questions, but are worded differently as they refer to different time points		28 August 2009	
Application		03 September 2009	

Please note the following conditions of approval:

1. The Principal Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including:
 - a. Unforeseen events that might affect continued ethical acceptability of the project. Serious Adverse Events must be notified to the Committee as soon as possible. In addition the Investigator must provide a summary of the adverse events, in the specified format, including a comment as to suspected causality and whether changes are required to the Patient Information and Consent Form. In the case of Serious Adverse Events occurring at the local site, a full report is required from the Principal Investigator, including duration of treatment and outcome of event.
2. Amendments to the research project which may affect the ongoing ethical acceptability of a project must be submitted to the HREC for review. Major amendments should be reflected in a revised online NEAF (accompanied by all relevant updated documentation and a cover letter from the principal investigator, providing a brief description of the changes, the rationale for the changes, and their implications for the ongoing conduct of the study). Hard copies of the revised NEAF, the cover letter and all relevant updated documents with tracked changes must also be submitted to the HREC coordinator as per standard HREC

SOP. Further advice on submitting amendments is available from http://www.health.qld.gov.au/ohmr/html/regu/regu_home.asp

3. Amendments to the research project which only affect the ongoing site acceptability of the project are not required to be submitted to the HREC for review. These amendment requests should be submitted directly to the Research Governance Office/r (by-passing the HREC).
4. Proposed amendments to the research project which may affect both the ethical acceptability and site suitability of the project must be submitted firstly to the HREC for review and, once HREC approval has been granted, then submitted to the RGO.
5. Amendments which do not affect either the ethical acceptability or site acceptability of the project (e.g. typographical errors) should be submitted in hard copy to the HREC coordinator. These should include a cover letter from the principal investigator providing a brief description of the changes and the rationale for the changes, and accompanied by all relevant updated documents with tracked changes.
6. The HREC will be notified, giving reasons, if the project is discontinued at a site before the expected date of completion.
7. The Principal Investigator will provide an annual report to the HREC and at completion of the study in the specified format.
8. The District administration and the Human Research Ethics Committee may inquire into the conduct of any research or purported research, whether approved or not and regardless of the source of funding, being conducted on hospital premises or claiming any association with the Hospital; or which the Committee has approved if conducted outside Metro North Health Service District.

Should you have any queries about the HREC's consideration of your project please contact Mark Zgrajewski (Chairperson), via the HREC Coordinators on 07 38837851.

The HREC terms of Reference, Standard Operating Procedures, membership and standard forms are available from http://www.health.qld.gov.au/ohmr/html/regu/regu_home.asp

You are reminded that this letter constitutes ethical approval only. You must not commence this research project at a site until separate authorisation from the District CEO or Delegate of that site has been obtained.

A copy of this approval must be submitted to the District Research Governance Officer/Delegated Personnel with a completed Site Specific Assessment (SSA) Form for authorisation from the CEO or Delegate to conduct this research at the Nambour Hospital.

Once authorisation to conduct the research has been granted, please complete the Commencement Form (Attachment II) and return to the office of the Human Research Ethics Committee.

The HREC wishes you every success in your research.

Kind Regards,

For

Mr Mark Zgrajewski

CHAIR

REDCLIFFE-CABOOLTURE HUMAN RESEARCH ETHICS COMMITTEE

METRO NORTH HEALTH SERVICE DISTRICT

APPENDIX 5. Participant Information



Antenatal and Postnatal Physical Activity Consultations

Participant information

Why should I participate and how will I benefit?

One of the aims of this study is to develop an *enjoyable, beneficial* and safe physical activity program **FOR YOU**: pregnant women and mothers on the Sunshine Coast. In order to make sure that you will like it, I really need your opinion!! It doesn't matter whether you're active or not, your opinion is important to make sure all women like it, women who've always been active, women who would like to be active but don't know what's good and safe to do during pregnancy and women who were previously inactive. So if you participate in this study, I will make sure the program will be something you will like and enjoy!!

About the project

Many women become inactive or less active during pregnancy, not realising the importance and *benefits of being physically active* for themselves and their baby. This is why this study aims to find out why women are or aren't active and how to motivate women to become more active. We are *interested in what makes it hard or easy for you to be active* and how this changes over time during pregnancy and 3 months after pregnancy. In order to find out about these experiences and detect possible changes, an interview will be conducted every three months (end of first, second and third trimester and three months after pregnancy). Another aim is to investigate what women think would motivate them to become more active in terms of information, programs and facilities. This information will help to better understand the issues around physical activity participation during and after pregnancy and will inform the development of an enjoyable, beneficial and safe physical activity program for pregnant women and mothers on the Sunshine Coast in the near future.

About the Project Chief Investigator and organisation



My name is Michelle van Mulken (Project Chief Investigator), I am a PhD candidate at the University of the Sunshine coast and Health Promotion especially Physical Activity Promotion is my field of expertise. I've always been interested in how to motivate inactive people to adopt a more active lifestyle. This study has been developed in consultation with staff from Queensland Health and has been assessed and approved by the Metro North Health Service District, Redcliffe-Caboolture Ethics Committee.

Who can participate in this study?

If you're pregnant, in your first or beginning second trimester, at least 18 years old, not highly dependent on medical care and can understand, speak and read English you are welcome to participate in this study. If you wish to participate, just read through this form, sign the consent form in the envelope and either hand over the envelope to me now or send it later (no further stamps etc. are needed).

Will I be at risk or uncomfortable?

There are **no risks** to you because of your participation in this study. It is also not anticipated that there is anything that would make you feel uncomfortable. The interview will take place over the phone, which will enable you to **pick any place you feel most comfortable** for the interview and the questions asked are **very basic questions** regarding your physical activity behaviour, things that make it hard or easy for you to be active and what you think would motivate you to be more active. But if you do experience any discomfort during the study please tell the researcher and every attempt will be made to help you.

What is expected of the participant?

Participation only includes **1 interview every three months** with a total of 4 (1st at the end of the first or begin second trimester, 2nd at the end of the second trimester, 3rd at the end of the third trimester and the 4th and final at 3 months after your have given birth). Each interview will take approximately 30 minutes and will take place **over the phone on a time that is most**

convenient to you. Dates and times will be scheduled in with you and the interview questions will be sent a week prior to the interview with a reminder of the date and time. By agreeing to participate, you are giving consent for your responses to be included in any analysis and reporting of this data.

What are my rights as a participant?

Participation is entirely voluntary and you can withdraw at any time without penalty or comment.

Who will know the information that I provide?

Only the researcher will know your identity. Any analysis of the results of this interview will be reported as a pool of responses and your responses **will not be individually identifiable**. No identifying information about you will be used in any publications that may result from this research. The data will be kept in a secure, locked filing cabinet in a room that will be locked when not occupied. All data kept on the computer will only be accessed by password. Only the researcher/s will have access to these. At the completion of the project all the reports will be destroyed.

Results

Results will be published in order to share knowledge with other professionals. If you would like to know the results of this study, **the paper can be sent to you**. Your interest in receiving this paper will be inquired at the end of the study. As stated before, no identifying information about you will be used in any publications that may result from this research.

Contact

In the event that you have any queries or are dissatisfied or unhappy with any aspects of the study, please first approach the **Project Chief Investigator** on **0754565088** to express your query or complaint. If you are still not satisfied with the response, you may complain in writing or by telephone to the office of the **Executive Director** of the **Redcliffe Hospital, Metro North Health Service District** on **07 3883 7508**.

APPENDIX 6. Consent Form



University of the
Sunshine Coast

Antenatal and Postnatal Physical Activity Interviews

I agree to take part in this University of the Sunshine Coast research study as specified above. I have had the project explained to me, and I have read the Information Sheet, which I keep for my records.

I agree to be interviewed by the researcher

Yes

No

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

I understand that any data from the interview for use in reports will not, under any circumstances, contain names or identifying characteristics.

I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party.

I understand that reports based on the interview(s) will be kept in a secure storage and accessible to the researchers only. I also understand that the reports held by the university will be destroyed after completion of the study.

Participant's name: _____ Witness' name: _____

Signature: _____ Signature: _____

Date: _____ Date: _____

Interviewer's name: _____ Signature: _____

APPENDIX 7. Interview Questions: 1st, 2nd, 3rd trimester and 3 Months Postpartum



University of the
Sunshine Coast

Physical activity during the 1st trimester of pregnancy

Hello,here, from the University of the Sunshine Coast. Hope you were expecting my call. How are you today.....

Now before we start, I would like you to know that physical activity is defined as any movement of your body that results in using energy. It includes incidental activities (walking to shops, housework, gardening, etc.) and planned activities (swimming, walking, cycling, running, yoga, team sports, gym), and has different intensities ranging from low intensity to vigorous.

I also would like to say that there is no right or wrong answer. If you weren't active before or during pregnancy, please don't feel bad or feel like I'm judging you, because I'm not. All I'm trying to find out is what is preventing women from being active, what is motivating women who are active and how can I support or motivate women to become more or maintain active.

Is this your first pregnancy? _____

Lifestyle and physical activity behaviour before and during pregnancy

Relaxation

1. What do you do in order to relax? (probe: describe how you relax, when during the day and week would you do that and how often, what else?)

Lifestyle changes

2. How has your life changed since you found out you were pregnant? (Probe: explain)

Pre-pregnancy PA habits

3. How would you describe your physical activity habits before you became pregnant?
(Probe: what activities, incidental and planned, how often per week, what intensity and duration)

PA changes

4. Have your physical activity habits changed since you found out you were pregnant?
If so what did you change and why? (Probe: type of activity, intensity, duration, frequency)

Reasons for (not) exercising

5. Why do/don't you exercise? (probe if necessary: reasons for (not) being active before and during pregnancy)

Intention

6. Do you have any intention to change your PA habits in the next three months? Why?
(Probe: explain)

Barriers

7. Since you found out you were pregnant, has there been anything that made it hard or harder for you in being physically active? If so, what? (Probe: explain)

Enablers

- 8a. Since you found out you were pregnant, has there been anything that made it easy or easier for you in being physically active? If so, what? (Probe: explain)

- 8b. Is there anything that would have made it easier your you? (Probe: explain)

Individual factors

Attitude

9. How do you feel about physical activity in general and during pregnancy? (Probe if necessary: is it important-unimportant, enjoyable-unenjoyable, beneficial-harmful?) Why? (Probe: explain)

Knowledge

- 10a. What is your understanding of physical activity during and after pregnancy? How did you find out about it? (Probe: types, intensity, duration, frequency, explain)

- 10b. What is your understanding of the benefits of physical activity during and after pregnancy? How did you find out about it? (Probe: explain)

if unaware or insufficiently aware of the guideline and/or benefits:

10c. Do you think you have been less active in the first trimester, because you didn't know enough about PA during pregnancy like guidelines, benefits and safety? (Probe: explain)

Concerns

11a. Do you have any concerns regarding physical activity during and after pregnancy? If so, what are your concerns? (Probe: explain)

11b. Do you have any other concerns not related to physical activity? (Probe: explain)

When expressing concerns:

11c. Do you think you have been less active because of these concerns? (Probe: explain)

Expectancies and expectations

12a. What effect do you think being physically active during and after pregnancy will have on how you feel, your health and the baby's health? (probe if necessary: positive or negative outcome? explain)

12b. **If expectations are positive**, how important is that to you and why?
If expectations are negative, how bad is that to you and why?

Motivation

13. Since you found out you were pregnant, how motivated were you to be physically active? And why?
-

Priority

- 14a. How much of a priority is your own health now you're pregnant?
Why?
-

- 14b. How much of a priority is being physically active for you at the moment?
Why?
-

Self-efficacy

The PA recommendation during pregnancy in absence of complications is 30 min of moderate intensity exercise on at least 5 days a week.(Mention: moderate intensity is an intensity that can be classified as somewhat hard)

15. Do you think you have been meeting these recommendations since you found out you were pregnant?

If yes, how confident are you to continue throughout pregnancy and after recovering from labour.

If no, how confident do you feel about being able to change this in order to meet these recommendations throughout pregnancy and after recovering from labour?

Control beliefs

16. If you really wanted to, how confident do you feel you are in being PA when (if applicable):

- | | |
|------------------------------------|-------------------------------------|
| - You have other time commitments? | - When there is no childcare? |
| - You feel tired? | - No social support is available? |
| - Lack of motivation? | - You have no one to exercise with? |
| - Other barriers mentioned arise? | |
-

Normative beliefs

17. What would most people whose opinions you value (like family and friends) think if you would be physically active throughout your pregnancy? (Probe: would they approve)

Social environment

Social support

- 18a. Since you found out you were pregnant, has there been anyone who supported you to be physically active? If so, how did they support you? Why? Anyone else?

- 18b. Since you found out you were pregnant, has there been anyone who discouraged you to be physically active? If so, why? How? Anyone else?

- 18c. Since you found out you were pregnant, have you received any emotional support that has helped you to be physically active? If so, explain. (*Probe if necessary: it involves caring, love and empathy*)

- 18d. Have you received any information that supported you to be physically active? (from people, books, websites, leaflets, brochures, etc.) How useful was that?

18e. Would you prefer getting information from people, the internet or do you prefer printed materials like books or brochures? Why?

18f. Since you found out you were pregnant, have you received any practical support (help with childcare/housekeeping, provision of transportation or money) that helped you to be physically active? If so, explain.

18g. Did you join a social group, antenatal or exercise group or any other groups in which you feel like you belong before or during pregnancy? If so, did they support you to be physically active? (Probe: explain)

18h. What kind of support has helped you the most so far in being physically active? Why?

Physical environment

19a. Is there anything in your neighbourhood that makes it easier for you to be physically active? (probe: footpaths, cycle lanes, parks, gyms, pool, other exercise facilities, shops in walking distance) If so, explain.

19b. Is there anything in your neighbourhood that limits or prevents you from being physically active? (hills, weather, street lights, traffic) If so, explain.

19c. Do you consider your neighbourhood to be PA friendly? If so, explain.

19d. Since you found out you were pregnant, what health practitioners or community services have you been in contact with.

First pregnancy

20. Looking back to your first pregnancy, was that a different experience? If so, could you explain?

Probe: *During your first pregnancy, can you recall whether your PA habits were different? What about your attitude, expectations or knowledge regarding PA during pregnancy? Did you experience other barriers/enablers/receive different or more or less support/other concerns/difference in motivation or confidence to be active. Were you living in a different neighbourhood?*

Interventions

21. What physical activity programs, services or information would you like to be made available to you in order to help you to be more active (Probe if necessary: what do you think would work in order to get pregnant women and/or mothers more active?)

Demographics

To end with, I would like to ask you a few demographic questions if that's okay.

DEM1. How many weeks gestation are you? What is your due date?

DEM2. Which of the following age groups do you fit into:

- | | | |
|-------------------|--------------------------|---|
| <20 years | <input type="checkbox"/> | 1 |
| 20-29 years | <input type="checkbox"/> | 2 |
| 30-39 years | <input type="checkbox"/> | 3 |
| 40+ years | <input type="checkbox"/> | 4 |
| Refused to answer | <input type="checkbox"/> | 5 |

DEM3. Are you in a relationship at the moment? If so what type of relationship?

DEM4. Is this your first pregnancy? If not, how many kids do you have?

- | | | | |
|---|--------------------------|------|--------------------------|
| 1 | <input type="checkbox"/> | 3 | <input type="checkbox"/> |
| 2 | <input type="checkbox"/> | More | <input type="checkbox"/> |

DEM5. What is the highest level of education that you have completed?

- | | | | |
|-----------------------------------|----------------------------|-----------------------------------|----------------------------|
| Less than high school | <input type="checkbox"/> 1 | Year 12 or equivalent (16-17 yrs) | <input type="checkbox"/> 5 |
| Some high school | <input type="checkbox"/> 2 | Diploma or certificate | <input type="checkbox"/> 6 |
| Currently still at high school | <input type="checkbox"/> 3 | Bachelor degree or higher | <input type="checkbox"/> 7 |
| Year 10 or equivalent (14-15 yrs) | <input type="checkbox"/> 4 | Refused to answer | <input type="checkbox"/> 8 |

DEM6. Are you working at the moment? What is/was your previous occupation?

DEM7. Which of the following ranges best describes your household's income, from all sources before tax over the last 12 months?

- | | | | |
|----------------------|----------------------------|---------------------|----------------------------|
| Less than \$20,000 | <input type="checkbox"/> 1 | More than \$100,000 | <input type="checkbox"/> 5 |
| \$20,000 - \$30,000 | <input type="checkbox"/> 2 | Don't know | <input type="checkbox"/> 6 |
| \$30,001 - \$50,000 | <input type="checkbox"/> 3 | Refused to answer | <input type="checkbox"/> 7 |
| \$50,001 - \$100,000 | <input type="checkbox"/> 4 | | |

Thank you for your time

and

I wish you well during your remaining pregnancy



Physical activity during the 2nd trimester of pregnancy

For this interview, I would like to remember you again that physical activity is defined as any movement of your body that results in using energy. It includes incidental activities (walking to shops, housework, gardening, etc.), planned activities (swimming, walking, cycling, running, yoga, team sports, gym) and has different intensities ranging from low intensity to vigorous.

I also would like to mention again that there is no right or wrong answer. If you weren't active during your second trimester, please don't feel bad or feel like I'm judging you, because I'm not. All I'm trying to find out is what is preventing women from being active, what is motivating women who are active and how can I support or motivate women to become more or maintain active.

First I would like to talk about relaxation again.

Relaxation

1. What do you do in order to relax at the moment? Changes compared to first trimester? (probe: describe how you relax, when during the day and week would you do that and how often?)
-

Lifestyle and physical activity behaviour during pregnancy

Lifestyle change during pregnancy

2. Has your life changed in the second trimester compared to the first trimester? If so, what changed?
-

PA habits

3. Have your physical activity habits changed after the first trimester? If so why and what did you change? (Probe: change of activity, intensity, duration, frequency)

Reasons for (not) exercising

4. Why do/don't you exercise? (probe if necessary: reasons for (not) being active before and during pregnancy)

Intention

5. Do you have any intention to change your PA habits in the next three months?

Barriers

6. Thinking about the last 3,5 months (2nd trimester), has there been anything that made it hard or harder for you in being physically active? If so, what?

Enablers

7. Thinking about the last 3,5 months, has there been anything that made it easy or easier for you in being physically active? If so, what?

Individual factors

Attitude

8. How do you feel about physical activity in general? (Probe if necessary: is it enjoyable-unenjoyable, wise-unwise, beneficial-harmful?) Has your attitude changed?
-

Knowledge

9a. What is your current understanding of physical activity during and after pregnancy? (*Probe: types, intensity, duration, frequency and if the answer is different to the first interview, discuss this*) How did you find out about it?

9b. What is your current understanding of the benefits of physical activity during and after pregnancy? (*if the answer is different to the first interview, discuss this*) How did you find out about it?

if unaware of the guideline and/or benefits:

9c. Do you think you have been less active in the second trimester, because you didn't know enough about PA during pregnancy like guidelines, benefits and safety?

Concerns

10a. In the last 3,5 months, did you have any concerns regarding physical activity during and after pregnancy? If so, what were your concerns?

10b. Did you have any other concerns not related to physical activity?

When expressing concerns:

10c. Do you think you have been less active because of these concerns?

Expectations and expectancies

11a. What effect do you think being physically active during and after pregnancy will have on how you feel, your health and the baby's health.

11b. **If expectations are positive**, how important is that to you and why?
If expectations are negative, how bad is that to you and why?

Motivation

12. In the last 3,5 months, how motivated were you to be physically active? And why?

Priority

13a. How much of a priority was your own health in your second trimester?
Why?

13b. How much of a priority was being physically active?
Why?

Self-efficacy

The PA recommendation during pregnancy in absence of complications is 30 min of moderate intensity exercise on at least 5 days a week.(Mention: moderate intensity is an intensity that can be classified as somewhat hard)

14. Have you been meeting these recommendations in the last 3,5 months?

If yes, how confident are you to continue throughout pregnancy and after recovering from labour?

If no, how confident do you feel about being able to change this in order to meet these recommendations throughout pregnancy and after recovering from labour?

Control beliefs

15. If you really wanted to, how confident do you feel you are in being PA when:

- You have other time commitments?
- You feel tired?
- Lack of motivation?
- When there is no childcare?
- No social support is available?
- You have no one to exercise with?

Normative beliefs

16. What would most people whose opinions you value (like family and friends) think if you would be physically active throughout your pregnancy? (Probe: would they approve)

Social environment

Social support

17a. In your second trimester, has there been anyone who supported you to be physically active? If so, how did they support you? Why? Anyone else?

17b. Thinking about the last 3,5 months (2nd trimester), has there been anyone who discouraged you to be physically active? If so, why? How? Anyone else?

17c. Thinking about the last 3,5 months, have you received any emotional support that has helped you to be physically active? If so, explain. (*Probe if necessary: it involves caring, love and empathy*)

17d. Thinking about the last 3,5 months, have you received any information that supported you to be physically active? (from people, books, websites, leaflets, brochures, etc.) How useful was that?

17e. Thinking about the last 3,5 months, have you received any practical support (help with childcare/housekeeping, provision of transportation or money) that has helped you to be physically active? If so, explain.

17f. Thinking about the last 3,5 months, have you receive support to be physically active from a group in which you feel like you belong? (e.g. meeting with friends or social groups, mothers groups, exercise classes, or other groups) If so, explain.

17g. In the last 3,5 months, what kind of support has helped you the most in being physically active? Why?

Physical environment

18a. Do you still live in the same neighbourhood as three months ago?

18b. Is there anything that has changed in your neighbourhood that limits or prevents you from being physically active? (probe: absence of footpaths, parks, gyms, busy traffic, hills, etc.)

18c. Is there anything that has changed in your neighbourhood that has made being active easier for you?

18d. What health practitioners or community services have you been in contact within your second trimester?

Interventions

19. What physical activity programs, services or information would you like to be made available to you in order to help you to be more active/ what do you think would work in order to get pregnant women and/or mothers more physically active?

Demographics

20. Has anything changed regarding job, relationships status or household's income?

Thank you for your time!

Physical activity during the 3rd trimester of pregnancy

Now before we start, I would like you to remember you that physical activity is defined as any movement of your body that results in using energy. It includes incidental activities (walking to shops, housework, gardening, etc.), planned activities (swimming, walking, cycling, running, yoga, team sports, gym) and has different intensities ranging from low intensity to vigorous.

First I would like to talk about relaxation.

Relaxation

2. What do you do in order to relax? (probe: describe how you relax, when during the day and week would you do that and how often?)

Physical activity behaviour during pregnancy

PA habits

3. How would you describe your physically activity habits in the first trimester? (Probe: what activities, how often per week, what intensity and duration)

Lifestyle change after pregnancy

- 4a. How has your life changed in the second trimester compared to the first trimester of your pregnancy?

4b. Have your physical activity habits changed after the first trimester? If so why and what did you change? (Probe: change of activity, intensity, duration, frequency)

Barriers

5. Thinking about the last 3 months (2nd trimester), has there been anything that made it hard or harder for you in being physically active? If so, what?

Enablers

6. Thinking about the last 3 months, has there been anything that made it easy or easier for you in being physically active? If so, what?

Individual factors

Knowledge

7a. What is your current understanding of physical activity during and after pregnancy? How did you find out about it? (Probe: types, intensity, duration, frequency)

7b. What is your current understanding of the benefits of physical activity during and after pregnancy? How did you find out about it?

Knowledge/concerns

7c. In the last 3 months, did you have any concerns regarding physical activity during and after pregnancy? If so, what were your concerns?

7d. Did you have any other concerns not related to physical activity?

Self-efficacy

The PA recommendation during pregnancy in absence of complications is 30 min of moderate intensity exercise on at least 5 days a week. (Mention: moderate intensity is an intensity that can be classified as somewhat hard)

8. Have you been meeting these recommendations in the last 3 months?

If yes, how confident are you to continue throughout pregnancy and after recovering from labour.

If no, how confident do you feel about being able to change this in order to meet these recommendations throughout pregnancy and after recovering from labour?

Expectancies

9. What are your expectations about being physically active during pregnancy? (Probe: how do you think it will make you feel, what effect do you think it'll have on your pregnancy)

Expectations

10. If expectancies are positive →How important is that to you and why? If negative → how bad is that to you and why?

Motivation

11. In the last 3 months, how motivated were you to be physically active? And why?

Priority

12. How much of a priority is being physically active for you now you're pregnant? Why?

Social environment

Social support

13a. Since you found out you were pregnant, has there been anyone who supported you to be physically active? If so, how did they support you? Why? Anyone else?

13b. Thinking about the last 3 months (2nd trimester), has there been anyone who discouraged you to be physically active? If so, why? How? Anyone else?

13c. Thinking about the last 3 months, have you received any emotional support that has helped you to be physically active? If so, explain. (*Probe if necessary: it involves caring, love and empathy*)

13d. Thinking about the last 3 months, have you received any information that supported you to be physically active? (from people, books, websites, leaflets, brochures, etc.) How useful was that?

13e. What is your preferred format of information? Why?

13f. Thinking about the last 3 months, have you received any practical support (help with childcare/housekeeping, provision of transportation or money) that has helped you to be physically active? If so, explain.

13g. Thinking about the last 3 months, have you received support to be physically active from a group in which you feel like you belong? (e.g. meeting with friends or social groups, mothers groups, exercise classes, or other groups) If so, explain.

13h. In the last 3 months, what kind of support has helped you the most in being physically active? Why?

Physical environment

14. Is there anything in your neighbourhood that enables you in being physically active?

15. Is there anything in your neighbourhood that limits or prevents you from being physically active?

Interventions

16. What physical activity programs, services or information would you like to be made available to you in order to help you to be more active/ what do you think would work in order to get pregnant women and/or mothers more physically active?

Demographics

17. Has anything changed regarding job, relationships status or household's income?

Thank you for your time!



Physical activity after childbirth

Hello,here, from the University of the Sunshine Coast. Hope you were expecting my call. How are you and how's the baby?.....

Now before we start, I would like to remember you again that physical activity is defined as any movement of your body that results in using energy. It includes incidental activities (walking to shops, housework, gardening, etc.), planned activities (swimming, walking, cycling, running, yoga, team sports, gym) and has different intensities ranging from low intensity to vigorous.

Birth information

Method of delivery: Was is a normal birth or C-section?

Were there any complications during or after labour?

Birth weight?

Facility type: at home or hospital?

When I met you at the antenatal clinic, was that your first visit?

General state

How did you feel in those first 3 months after the baby was born?

Relaxation

1a) Did you feel more need to rest or relax?

1b) What did you do in order to relax? (probe: describe how you relax, **when during the day and week would you do that and how often**, what else?)

Lifestyle and physical activity behaviour before and during pregnancy

Lifestyle changes

2. How has your life changed since you had your baby?

PA changes

3. Have your physical activity habits changed since you had your baby?
If so why and what did you change? (Probe: change of activity, intensity, duration, frequency)

Reasons for (not) exercising

4. Why did/didn't you exercise?

Intention

5. Do you have any intention to change your PA habits in the next three months?

Barriers

6. Since you had your baby, has there been anything that made it hard or harder for you in being physically active? If so, what?

Enablers

7. Since you had your baby, has there been anything that made it easy or easier for you in being physically active? If so, what?

Individual factors

Attitude

8. How do you feel about physical activity in general? (Probe if necessary: is it enjoyable-unenjoyable, wise-unwise, beneficial-harmful?)

Knowledge

- 9a. Did you receive new information after you had your baby or read anything new regarding exercise after pregnancy? (probe: when to start exercising, what activities to do, when more strenuous exercise can be initiated, benefits)

if unaware of the guideline and/or benefits:

- 9b. Do you think you have been less active in the past 3 months after childbirth, because you didn't know enough about PA during pregnancy like guidelines, benefits and safety?

Concerns

- 10a. Did you have any concerns regarding physical activity after childbirth?
If so, what were your concerns?

- 10b. Did you have any other concerns not related to physical activity?

When expressing concerns:

- 10c. Do you think you have been less active because of these concerns?

Expectancies and expectations

11a. What effect do you think being physically active after pregnancy will have on your physical and mental health?

11b. **If expectations are positive**, how important is that to you and why?
If expectations are negative, how bad is that to you and why?

Motivation

12. Since you've had your baby, how motivated were you to be physically active? And why?

Priority

13a. How much of a priority is your own health the first three months after you had your baby and now? Why?

13b. How much of a priority was being physically active? Why?

Self-efficacy

After normal childbirth, easy exercise can be started when comfortable, but more intense exercise is not advised for the first 6 weeks. After these 6 weeks, exercise should be increased gradually to a level that you are happy with, aiming for 30 minutes of moderate intensity exercise on at least 5 days of the week. In case of a caesarean section, doctor's and hospital staff's instructions have to be followed, but in general easy exercise can be started after 6 weeks as long as the wound is well healed.

15. Do you think you have been meeting these recommendations after you had your baby?

If yes, how confident are you to continue.

If no, how confident do you feel about being able to change this in order to meet these recommendations?

Control beliefs

16. If you really wanted to, how confident do you feel you are in being PA when:

- You have other time commitments?
 - You feel tired?
 - Lack of motivation?
 - When there is no childcare?
 - No social support is available?
 - You have no one to exercise with?
-

Normative beliefs

14. What would most people whose opinions you value (like family and friends) think if you would be physically active at the moment? (Probe: would they approve)

Social environment

Social support

17a. Since you recovered from childbirth your baby, has there been anyone who supported you to gradually increase your physical activity level? If so, how did they support you? Why? Anyone else?

7b. Since you recovered from childbirth, has there been anyone who discouraged you to be physically active? If so, why? How? Anyone else?

17c. Since you recovered from childbirth, have you received any emotional support that has helped you to be physically active? If so, explain. (*Probe if necessary: it involves caring, love and empathy*)

17d. Have you received any information that supported you to be physically active after recovery? (from people, books, websites, leaflets, brochures, etc.) **How useful** was that? **In case of a caesarean section, what did the doctor/nurses tell you?**

17e. Since you recovered from childbirth, have you received any practical support (help with childcare/housekeeping, provision of transportation or money) that helped you to be physically active? If so, explain.

17f. Since you recovered from childbirth, have you received support to be physically active from a group in which you feel like you belong? (e.g. meeting with friends or social groups, mothers groups, exercise classes, or other groups) If so, explain.

17g. What kind of support has helped you the most so far in being physically active after recovery? Why?

Sense of community (if moved, different before??)

18. Answer the next questions (prompt after every question: why?)

- Does your neighbourhood give you a sense of community?
- Do you regularly stop and talk to people in your neighbourhood?
- Is it easy to make friends in your neighbourhood?
- Do you regularly seek advice from people in your neighbourhood?
- Do you regularly borrow things and exchange favours with your neighbours?
- Would you be willing to work together with others on something to improve the living environment in my neighbourhood?

Physical environment

19a. Do you still live in the same neighbourhood as three months ago?

19b. Is there anything that has changed in your neighbourhood that limits or prevents you from being physically active? (probe: absence of footpaths, parks, gyms, busy traffic, etc.)

19c. Is there anything that has changed in your neighbourhood that has made being active easier for you?

19d. Is it important to you that your neighbourhood is physical activity friendly in order to be active? (probe: do you need footpaths, cycle lanes, parks, gyms, pools, shops close, etc.)

19e. What health practitioners or community services have you been in contact with after childbirth?

First pregnancy

20. Looking back to your first pregnancy, was that a different experience?

Probe: *After your first pregnancy, can you recall whether your PA habits were different? What about your attitude, expectations or knowledge regarding PA during pregnancy? Did you experience other barriers/enablers/receive different or more or less support/other concerns/difference in motivation or confidence to be active. Were you living in a different neighbourhood?*

Interventions

21. After you've experienced those first three months, what physical activity programs, services or information would support or motivate you and/or other new mothers to become active again after recovering from labour?

**Thank you so much for completing all 4 interviews, you've been of great help!
I'm sure a lot of future pregnant women will appreciate your input into the
program that will be developed based on the information you provided!**

Enjoy your new baby and I wish you all the best!

APPENDIX 8. Characteristics of Intervention suggestions

Strategy suggestions	Characteristics		
	Individual	Social environment	Physical environment
Informational support <ul style="list-style-type: none"> • <i>Addressing sickness and other physical discomfort</i> • <i>Addressing the social stigma attached to pregnancy</i> 	<ul style="list-style-type: none"> • Creating more positive PA beliefs • Increasing knowledge in relation to antenatal and postpartum PA • Assisting in prevention or management of sickness and other physical • Increasing confidence in women's ability to engage in sufficient physical activity for health benefits • Addressing the guilt attached to self-care such as PA 	<ul style="list-style-type: none"> • Providing information on PA during pregnancy and postpartum, and on how to prevent or manage sickness and other physical discomforts • Improving the social norm in relation to antenatal physical activity • Addressing the restrictive nature of current gender role expectations to reduce social role strain • Reducing the social stigmatisation of pregnancy 	
Finding a healthy balance: self-care and care for others	<ul style="list-style-type: none"> • Creating more positive PA beliefs • Increasing knowledge in relation to antenatal and postpartum PA • Increasing confidence in women's ability to engage in sufficient physical activity for health benefits. • Addressing the guilt attached to self-care such as PA • Increasing self-worth 	<ul style="list-style-type: none"> • Providing information on PA during pregnancy and postpartum • Improving the social norm in relation to antenatal physical activity • Addressing the restrictive nature of current gender role expectations to reduce social role strain 	
PA self-efficacy: barrier self-efficacy and self-regulatory efficacy	<ul style="list-style-type: none"> • Increasing confidence in women's ability to engage in sufficient physical activity for health benefits 		

Partner support and equal division of leisure time	<ul style="list-style-type: none"> • Increasing confidence in women's ability to engage in sufficient physical activity for health benefits 	<ul style="list-style-type: none"> • Addressing the restrictive nature of current gender role expectations to reduce social role strain • Providing emotional and practical support via partner or significant others • Increasing PA companionship from partner or significant others 	
Improving postnatal contact with health professionals	<ul style="list-style-type: none"> • Increasing knowledge related to self-care and care for their baby • Increasing women's confidence in their maternal skills and their ability to engage in sufficient physical activity for health benefits 	<ul style="list-style-type: none"> • Improving contact via home visits and/or phone calls to provide information and practical tips in order to increase women's maternal self-efficacy 	
Stimulating inter-women communication	<ul style="list-style-type: none"> • Increasing confidence in women's ability to engage in sufficient physical activity for health benefits • Increasing women's motivation to engage in PA 	<ul style="list-style-type: none"> • Providing women with emotional support • Improving opportunities for communication between pregnant women and mothers in the same neighbourhood • Improving the social norm in relation to antenatal and postpartum physical activity • Addressing the restrictive nature of current gender role expectations • Improving the sense of community and interconnectedness within the community 	
Local and low cost exercise groups and companionship	<ul style="list-style-type: none"> • Creating more positive PA beliefs • Increasing confidence in women's ability to engage in sufficient physical activity for health benefits • Increasing women's motivation to engage in PA 	<ul style="list-style-type: none"> • Increasing PA companionship from peers • Providing women with emotional support • Improving opportunities for communication between pregnant women and mothers in the same neighbourhood • Improving the social norm in relation to antenatal and postpartum physical activity • Reducing the social stigmatisation of pregnancy • Improving the sense of community and interconnectedness within the community 	<ul style="list-style-type: none"> • Creating low cost exercise options • Developing exercise locations flexible to weather conditions

Building social capital		<ul style="list-style-type: none"> • Stimulating PA companionship • Improving opportunities for communication between people within the same neighbourhood • Improving the social norm in relation to PA • Improving the sense of community and interconnectedness within the community 	
Promoting public breastfeeding	<ul style="list-style-type: none"> • Creating more positive beliefs in relation to public breastfeeding • Increasing confidence to breastfeed in public 	<ul style="list-style-type: none"> • Creating a social norm that supports public breastfeeding 	
A physical environment that promotes physical activity	<ul style="list-style-type: none"> • Increasing motivation to engage in PA • Increasing confidence in women's ability to engage in sufficient physical activity for health benefits 	<ul style="list-style-type: none"> • Improving the sense of community and interconnectedness within the community 	<ul style="list-style-type: none"> • Improving environmental aesthetics • Improving neighbourhood walkability • Improving neighbourhood safety

PA= Physical activity

