

THE ATTITUDES AND BELIEFS OF PREGNANT WOMEN AND MIDWIVES TOWARDS
PHYSICAL ACTIVITY DURING PREGNANCY

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Candidate's declaration

I, Genevieve Koellner, declare that this Dissertation is my own, unaided work. It is being submitted for the degree of Master of Science in Medicine in the field of Sports and Exercise Science at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.



18th day of _____ 2022 in _____ August _____
(Signature of candidate)

Dedication

This dissertation is dedicated to my late mother, Marinda Koellner (1966-2010), who made me the person that I am today and supported myself and my dreams.

My sister, Natasha Koellner, who is my role model that I look up to and who kept motivating me throughout my years of studying.

To my father, Jan Naude Koellner, for financially supporting me and for providing these opportunities for me during this time.

Abstract

Background: Regular physical activity during pregnancy can decrease the likelihood of excessive gestational weight gain (GWG) and postpartum weight retention. It can improve one's mood, decrease depression and stress levels, enhance psychological wellbeing, reduce the risk of gestational diabetes, pre-eclampsia, caesarean deliveries and lumbar pain. Women perceive a healthy lifestyle as beneficial for their children, making pregnancy an opportune time to discuss healthy living. As the interest in participating in sport activities and being active is increasing, so is the question on safety of exercise in general and during pregnancy for both mother and foetus. Therefore, the aim of this master's dissertation study was to determine the attitudes and beliefs that pregnant women and midwives have towards physical activity during pregnancy.

Methods: This study used a qualitative study design, conducting one-on-one interviews and focus group discussions, virtually or in-person during the early phases of the Covid-19 lockdown measures. Two population groups of interest were included in the study. The first included qualified midwives with experience providing care and support to expecting women and, the second included pregnant women. Participants were recruited through purposive sampling and, interviews were conducted between 01 December 2020 and 30 March 2021. The interviews took approximately 30 minutes. All discussions were audio taped after obtaining permission from participants and then transcribed verbatim by a commercial transcription service. A deductive logic approach within the theory of planned behaviour was used. All focus groups were conducted in English. Data were analysed and coded by the use of MAXQDA software, placed into a table format to identify relevance, and divided into themes and sub-themes.

Results: The midwives had a mean age of 43 (29-60) years and a mean of 15 (1-36) years active as a midwife. The pregnant women had a mean age of 27 (21-33) years and a mean BMI of 26 kg/m² (20.86 - 34.2 kg/m²). The pregnant women had a mean gestational age of 17 weeks (12 – 28) weeks. Physical activity was seen as beneficial for a healthy pregnancy by both groups. Major barriers to exercise during pregnancy included; transport, location and time. The midwives were perceived to lack knowledge on the safety of exercises, weight gain during pregnancy and types of exercises that can be done by the pregnant women. This leads to the distrust in midwives and their knowledge which leads to a decrease in a pregnant women's adherence to physical activity. The midwives perceived their midwifery curriculum

lacked information regarding physical activity during pregnancy and would find it beneficial if it were added into future midwifery programmes.

Conclusions: The findings of this study indicate that there is a clear need for education programmes on the benefits of physical activity during pregnancy in the community and amongst midwives employed in private hospitals. Further investigation is required to develop interventions that target barriers to physical activity and exercise during pregnancy and to support adherence to exercise programmes.

Keywords: Benefits of exercise during pregnancy; Barriers to exercise; Enablers to exercise; Health care workers; Types of exercises

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List of abbreviations

- BMI: Body Mass Index
- COVID-19: Coronavirus Disease 2019
- GWG: Gestational Weight Gain
- GDM: Gestational Diabetes Mellitus
- LTPA: Leisure Time Physical Activity
- PA: Physical Activity
- TPB: Theory of Planned Behaviour
- UK: United Kingdom
- USA: United States of America

Definition of terms

- Attitudes - A mindset or tendency to act in a particular way due to both an individual's experience and temperament.
- Beliefs – Something that one accepts as true or real; a firmly held opinion.
- Body Mass Index – Is the metric used for defining kilograms per metre squared.
- COVID-19 – (Sars-Cov-2) Ribonucleic acid (RNA) virus that can cause severe acute respiratory diseases (COVID-19) and serious infections of the lower respiratory tract followed by fibrosis, pneumonia and bronchitis.
- Gestational Weight Gain – is defined as the weight a woman gains during pregnancy.
- Gestational Diabetes Mellitus - is a form of diabetes defined as any degree of glucose intolerance with onset, or first recognition, during pregnancy.
- Light intensity physical activity – World Health Organisation (WHO) guidelines for meeting the recommended weekly physical activity. On an absolute scale, it is physical activity performed between 1.5 – 3 metabolic equivalents (METs). On a scale relative to an individual's personal capacity, physical activity that is usually a 2–4 on a rating scale of perceived exertion scale of 0–10.
- METs – Metabolic equivalents. One MET is defined as the energy you use when resting or sitting still.
- Moderate intensity physical activity – World Health Organisation (WHO) guidelines for meeting the recommended weekly physical activity. On an absolute scale, it refers to the physical activity that is performed between 3 and <6 times the intensity of rest (METs). On a scale relative to an individual's personal capacity, it is usually a 5 or 6 on a rating scale of perceived exertion scale of 0–10.
- Physical activity - Any bodily movement produced by skeletal muscles that requires energy expenditure.
- Sedentary behaviour - Any waking behaviour characterised by an energy expenditure of 1.5 METs or lower while sitting, reclining or lying.
- Vigorous intensity physical activity – World Health Organisation (WHO) guidelines for meeting the recommended weekly physical activity. On an absolute scale, vigorous intensity refers to physical activity that is performed at 6.0 or more METs. On a scale relative to an individual's personal capacity, vigorous physical activity is usually a 7 or 8 on a rating scale of perceived exertion scale of 0–10.

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Chapter 1

1.1 Introduction

Obesity in South African women is associated with physical inactivity (1) and 57% of South African women are overweight, which is almost three-fold more than men (2). Even though obesity prevalence varies in different countries, there is an increase in maternal obesity in Africa, causing it to be a public health issue (3). It has been shown that obesity is associated with low education, ethnicity and cultural beliefs, such as those individuals that are physically bigger are usually seen as being more financially stable (3). There is a higher risk for the onset of disease during pregnancy in obese women such as gestational diabetes (4), hypertension (5), pre-eclampsia (6), prolonged labour (7), macrosomia (8) and deliveries by caesarean section (9).

Physical activity can be defined as any bodily movement produced by skeletal muscles that requires energy expenditure (10). The likelihood of excessive gestational weight gain (GWG) (11) and postpartum weight retention can be reduced by engaging in regular physical activity during pregnancy (12). The risk of caesarean delivery, pre-eclampsia and gestational diabetes can be lowered by being active during pregnancy (13).

As the interest in participating in sport and becoming physically active is increasing so is the question on safety of exercise in general and during pregnancy for both mother and foetus (14). Regular exercise is recommended for all uncomplicated pregnancies as it can provide many physical and psychological benefits (15) for both mother and foetus (16). Despite the potential benefits of being physically active, women tend to decrease their time spent engaging in physical activity after conception (17). Additionally, absence of motivation, lack of time (17), mother-child safety concerns, insufficient appropriate advice and accessible information (18) are reported barriers to exercise.

Midwives in South Africa have a comprehensive scope of practice which includes education, counselling and family planning services (19). Midwives provide antenatal, intrapartum, postpartum care for women and new-borns with uncomplicated pregnancies (19). Midwives play a very important role; they have the ability to identify and improve any incorrect pregnancy practices, they assist with latching for breast-feeding, vaccination and other baby care as they are more likely to interact and communicate with pregnant women than all other health

professionals (20). Advice provided by midwives is trusted by women as they are perceived to have expertise on pregnancy (21).

It is important to understand the beliefs of pregnant women towards physical activity during gestation as this will inform the limited evidence on their views of active living during pregnancy (17). The interaction between midwives and pregnant women can result in improved health outcomes (22). Thus, the perception and knowledge of midwives as carers and enablers of good health outcomes during pregnancy is of utmost importance.

1.2 Problem statement

Regular participation in physical activity has many health benefits for pregnant women such as; improved mood, a decrease in depression and stress levels, enhancing psychological wellbeing, aiding in the management of gestational weight, reducing the risk of gestational diabetes, pre-eclampsia, caesarean deliveries and lumbar pain (1, 5,15). Yet, epidemiological data based on the National Health and Nutrition Examination Survey (NHANES) shows that only about (15%) (24) of prenatal women engage in the recommended amount of physical activity which is ≥ 150 minutes (~20-30 minutes a day on at least 5 days) of moderate intensity aerobic activity per week (25). Additionally, Muzigaba et al. (2014) found that out of a sample of 34 pregnant South African women, 44% of them were physically inactive. Evenson and Bradley (2010) reported that a representation of women (22%, n=288) believed that they should not continue with regular exercise throughout pregnancy.

Pregnant women develop their own ideas on gestational weight gain and are unaware when they are overweight due to the absence of counselling from health care workers (22). These ideas can be formed by social media, culturally (due to cultural and religious beliefs some pregnant women are prevented from doing any form of physical activity) (26) and by peers. Given the limited understanding of the reasons for the lack of physical activity in pregnant women, this masters study was focused on pregnant women and midwives' attitudes and beliefs on exercise. It is also important to understand the reasons why pregnant women exercise, whether they find it difficult to exercise, and how the midwives can encourage physical activity during pregnancy. These findings are important for the development of interventions to increase adherence to physical activity during pregnancy.

1.3 Research question

What attitudes and beliefs do pregnant women and midwives have towards physical activity during pregnancy?

1.4 Study aim

The aim of this study was to determine the attitudes and beliefs that pregnant women and registered midwives have towards physical activity during pregnancy.

1.4.1 Study objectives

- To assess the attitudes, beliefs and practices of pregnant women towards physical activity during pregnancy
- To assess the attitudes, beliefs and practices of midwives towards physical activity during pregnancy

1.5 Conclusion

The purpose of this study was to identify the attitudes and beliefs of pregnant women and midwives towards physical activity during pregnancy. This is important as it can aid in the development of interventions aimed at increasing pregnant women's physical activity levels.

Chapter 2: Literature review

This literature review is a comprehensive extension of the concepts introduced earlier. The following sections will be discussed: benefits of physical activity during pregnancy, the types of exercises for pregnant women, comorbidities during pregnancy, beliefs and barriers of exercise during pregnancy and the midwives beliefs and attitudes towards physical activity during pregnancy. This literature is relevant to the understanding of the reasons for being active during pregnancy.

2.1 Benefits of physical activity during pregnancy

Sedentary behaviour, defined as any walking behaviour characterised by an energy expenditure of 1.5 METs or lower while sitting, reclining or lying, (10) during the prenatal period increases the risk of pre-eclampsia, gestational weight gain (GWG) and gestational diabetes mellitus (GDM) (27). Exercise is defined as physical activity consisting of planned, structured and repetitive bodily movements performed to improve one or more components of physical fitness (28). Physical fitness is defined as how “fit” a person is to cope with the demands set by their environment (29), examples for pregnant women include: upper body strength, lower body strength, flexibility and cardiorespiratory fitness (30). Due to the minimal risks (Table 2.1) associated with exercise, healthy pregnant women should engage in a minimum of 150 minutes (20 - 30 minutes, 5 days) of moderate intensity aerobic activity. On an absolute scale, it refers to the physical activity that is performed between 3 and <6 times the intensity of rest (METs) (10). On a scale relative to an individual's personal capacity, it is usually a 5 or 6 on a rating scale of perceived exertion scale of 0–10 (10) per week during the pregnancy and in the postnatal period (25). This level is similar to that of the non-pregnant population and is currently being recommended according to the guidelines in the United Kingdom (13), Denmark (13) and the United States of America (USA) (13).

Prenatal exercise includes benefits such as increased cardiovascular fitness and an easier birth (31). Starting and continuing a supervised exercise programme throughout pregnancy shows a decrease in total labour time (22) and is beneficial in women with diabetes (28). Hegaard et al. (2007) found that women who remained active before and/or during the prenatal period had a lower or unchanged risk of preterm delivery, pre-eclampsia and GDM.

Table 2.1: Benefits of physical activity during pregnancy

Benefits associated with physical activity during pregnancy	Authors
Manages gestational weight	American College of Obstetricians and Gynaecologists (2020)
Enhances psychological wellbeing	American College of Obstetricians and Gynaecologists (2020)
May reduce the risk of gestational diabetes	American College of Obstetricians and Gynaecologists (2020)
May reduce the risk of pre-eclampsia	American College of Obstetricians and Gynaecologists (2020)
Prevention of stress urinary incontinence	Lippincott Williams & Wilkins (2013)
May reduce the risk of caesarean deliveries	American College of Obstetricians and Gynaecologists (2020)
Decreases depression	Lippincott Williams & Wilkins (2013)
Reduced lumbar pain	Lippincott Williams & Wilkins (2013)

Recent studies have shown physical activity to have a positive effect on psychologic factors such as mood and levels of stress (9). Thus, a moderate intensity exercise programme can improve emotional factors throughout the pregnancy and reduce postpartum depressive symptoms (32) (33).

Exercising during pregnancy has a positive association with increased bone density, strength, metabolic and cardiovascular function (34). A higher satisfaction with energy levels, physical stamina and appearance was reported by pregnant women that participated in 180 minutes of vigorous exercise weekly when compared to sedentary pregnant women (35). Therefore, physical activity has obvious health benefits for pregnant women.

2.2 Types of exercises for pregnant women

Appropriate exercise types for pregnant women include Kegel exercises (pelvic floor strengthening exercises), resistance exercises (weightlifting), strength training (see figure 1a), flexibility exercises (see figure 1b) and aerobic exercises (36). Strengthening of the abdominal and back muscles may reduce the risk of lower back pain that is associated with pregnancy (13).

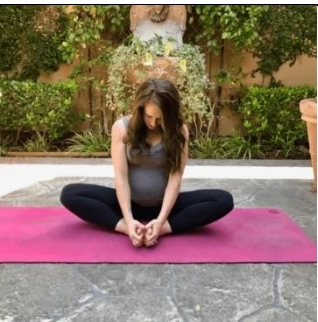
		
Figure 1 (a) Strength training (37) Pregnant women doing dumbbell bicep curls.	(b) Flexibility exercises (38) Pregnant women doing butterfly stretch.	(c) Swimming exercises (39) Pregnant women swimming on back and kicking legs.
		
(d) Group exercises (40) Pregnant women group exercise classes.	(e) Brisk walking (41) Pregnant women walking as a form of aerobic activity.	

Figure 1 – Examples of exercises for pregnant women

Activities that increase the risk of falling, joint stress and those that place stress on the body in a supine position should be cautioned against after 20 weeks into pregnancy as this may decrease the venous return due to aortocaval compression from the gravid uterus, leading to hypotension (13).

Physical activities such as brisk walking, aqua therapy, resistance exercises and other aerobic exercises (swimming [See Figure 1c] , brisk walking [Figure 1e]) is considered safe and desirable in the absence of existing medical or obstetric complications (27).

Group exercise classes (see Figure 1d) may promote a more active pregnancy and increase adherence especially if they address the safety of exercises and knowledge for pregnant women (42)(43).

2.3 Contraindications to exercise during pregnancy

Some exercises are contraindicated in pregnancy (36). These can be considered as, either relative (acceptable if the benefit outweighs the risks) or absolute (absolutely inadvisable) contraindications. Aerobic exercise is absolutely contraindicated in some maternal medical conditions such as restrictive lung disease, placenta praevia > 26 weeks gestation, pregnancy induced hypertension, incompetent cervix and ruptured membranes (36). Relative contraindications include severe anaemia, chronic bronchitis, extreme underweight or morbidly obese and unevaluated maternal cardiac arrhythmia (31). Therefore, women who have existing medical or maternal complications should undergo a thorough clinical examination to assess whether exercise should be restricted or allowed (13). This is also important for women who experience a visible separation of the abdominal muscles, diastasis recti (44) during pregnancy, they should seek advice on abdominal strengthening exercises as certain exercises may worsen the condition (45).

As pregnancy progresses throughout the different trimester's women may need to modify their physical activity as being active may not be possible due to fatigue or the discomforts associated with pregnancy. Therefore the type, frequency and duration of exercise needs to be taken into account in order to benefit (46).

Socio-demographic variables such as age, income, education, ethnicity and size of family are predictors of participating in physical activity or exercise during pregnancy (17). Due to the affordability and availability of the facilities in their community wealthier women are more likely to exercise (17). Educated women (those with a higher education) are more likely to be aware and perceive the benefits of exercise during pregnancy than uneducated women (47). Research shows younger women more than older women participate in prenatal exercise (47). Additionally, Liu et al. (2011) reported that fit, healthy, parous, younger women were less likely to reduce their physical activity levels during pregnancy, (48) this is likely due to the older women not being as up to date with the younger generation and the latest information. Gaston and Cramp (2011) found that those with a lower education, having other children in the home and lower income were at an increased risk of inactivity (17).

2.4 Beliefs of exercise during pregnancy

During pregnancy women are concerned around the health of the child thus making pregnancy an opportune time to discuss healthy living (12). A large sample of the participants in the study done by Watson et al. (2016) were conscious that a healthy diet, rest and exercise during pregnancy was important (42). Almost all (98%, n=1280) of the women from the study carried out by Evenson and Bradley (2010) agreed with the benefits of light activity compared to that of moderate (73%, n=954) and vigorous (13%, n = 170) exercise and a large portion of that sample agreed that women who never exercised before pregnancy could begin exercising during pregnancy (49).

Research suggests women that were active before pregnancy could continue throughout pregnancy and the postpartum period (25). Health care workers should know when and how to adjust activity levels in women who engaged in strength or aerobic exercises before pregnancy and that remain healthy (25). Additionally, activity should be gradually increased, “start low, go slow”, over time when beginning physical activity during pregnancy (25).

Child and infant safety concerns is a major barrier to exercise as women are worried about causing any harm to the baby, by leading to a miscarriage or premature labour (18). The study carried out by Marshall et al. (2013) indicated that women perceived themselves as already being sufficiently physically active by engaging in daily life activities such as childcare (50).

Pregnant women reported an absence of motivation, pain with movement, anxiety and a reduced availability of time due to family and work responsibilities as barriers to exercise (14, 46). Pregnancy related symptoms such as fatigue, nausea and bodily changes affected how active women were during pregnancy (18). However, some women reported that they can overcome these barriers on the basis of their own experience; by changing the activity, using different equipment or continuing at a lower intensity (27). This experience comes from modelling the behaviours of other women, the help from midwives and role models (27). These studies highlight the importance of this master's dissertation research as it provides the information on barriers to exercise, the attitudes and beliefs of both the pregnant women and the midwives to exercise during pregnancy. Adding to the research to allow for future interventions to be designed to target these barriers and increase physical activity during pregnancy.

2.5 Comorbidities during pregnancy

2.5.1 Gestational diabetes

Gestational Diabetes Mellitus (GDM) is a form of diabetes defined as any degree of glucose intolerance with onset, or first recognition, during pregnancy (52). Risk factors for developing GDM are overweight or obese women, diabetes in the family and advanced maternal age (53). GDM increases a women's risk of developing type 2 diabetes post pregnancy (54). Children of women with GDM have a higher risk of glucose intolerance, obesity and diabetes later in their life (54).

The relationship between exercise and a reduced risk of GDM is consistent in the research. All studies show a decrease in prevalence of GDM upon the increase of exercise (Table 2.5.1). Ruchart et al. (2012) found that women that are at an increased risk of developing GDM should be active for 35-40 min at a reduced intensity three to four times weekly and at a vigorous intensity for 25 min for the best decline in capillary glucose concentrations ($p = 0.02$). Additionally, Oken et al. (2007) found that engaging in light to moderate or vigorous intensity exercise during pregnancy reduced the risk of both gestational diabetes mellitus (OR 0.49, 95% CI 0.24–1.01) and abnormal glucose tolerance (OR 0.70, 95% CI 0.49–1.01) when compared to inactive women. Dempsey et al. (2004) found that women who were physically active before and during pregnancy reduced their risk of developing GDM by 69% (RR = 0.31, 95% CI: 0.12,0.79) when compared to inactive women.

Table 2.5.1: The effect of exercise on Gestational Diabetes

Study	Participants at baseline	Exercise assessment	Study design	Exercise intervention	Effect of exercise for reducing the key outcome
Ruchat et al. (2012) (8)	Pregnant 16 – 20 weeks pregnant. Women low risk (LR) or high risk (HR) for Gestational Diabetes Mellitus (GDM).	Walking programme 1 time a week at the lab and 2-3 sessions at home.	Randomized partially home based.	The supervised walking programme commenced after the peak test, of target heart rate zone of 30% or 70% HRR (heart rate reserve) three to four times per week. The average speed and incline sessions were 4.8 km/h, 1.4% grade (0–4% grade, min–max) in the 30%I group and 5.3 km/h (4.8–6.4 km/ h, min–max), 10.5% grade (4-12% grade, min–max) in the 70%I. Weekly, the amount of time at a certain intensity was increased by 2 min, when 30 min of exercise was reached, excluding a five-minute warm-up and five-minute cool-down. This was continued for	After 25min (4±13%), 35 min (21±12%) and 40 min (15 ±18%) of walking in Rate -30%I women significant drops in Capillary Glucose Concentrations were observed. A decrease in CGC was observed after 25 min (22 ±14%) and 35 min (7±23%) of walking in the Rate 70%I (n= 11) group. Increasing exercise time from 25 to 35 min reduced the decline significantly in Capillary Glucose Concentrations (p = 0.02).

				the duration of the programme.	
Nobles et al (2015) (57)	Pregnant women in the first trimester between the ages of 16 and 40 years. Pre-pregnancy $\geq 25\text{kg/m}^2$ with prior GDM diagnosis or family history of diabetes.	Participants to engage in 30 min of physical activity at a moderate intensity 3- 5 days a week. This time should increase by 10% weekly	Randomized control trial	Participants were provided with a step counter and a diary to write down their activity. Follow up questionnaire after 4,8 and 12 weeks. Monthly booster telephone calls and tip sheets were provided.	The gestational diabetes mellitus screen took place at a mean (SD) of 28.1 (2.9) weeks gestation (IQR 26.9, 29.4) and also did not differ between intervention groups (OR=0.60, 95% CI 0.27–2.32) In the second trimester there was no significant decrease in gestational diabetes mellitus, abnormal glucose screen or impaired glucose tolerance after the implementation of a personalised, specifically coordinated exercise intervention.
Bessinger et al (2002) (58)	13 pregnant women that were exercising 30 minutes a day, 2-3 times per week for at	During weeks 22 and 33 of gestation the women engaged in a 30-minute treadmill	Randomized controlled trial	The training comprised of 85 sessions which included aerobic exercise, strength training and flexibility. The training was three	There was a significant reduction in blood glucose levels after exercise when compared with rest ($P < .05$). The decrease was more significant

	least 3 months in their first or early second trimester.	walk at 65% of their predicted maximal heart rate.		days a week (50-55 min/ session) from gestation weeks 9-11 until weeks 38-39.	during pregnancy than after giving birth.
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2.5.2 Pre-eclampsia

One of the foremost causes of maternal mortality worldwide is pre-eclampsia (59). Pre-eclampsia is defined as gestational hypertension with proteinuria (24). The link between exercise and pre-eclampsia is consistent in the research as all have found that exercise decreases the risk of pre-eclampsia (see Table 2.5.2). Inactivity during pregnancy increases a women's risk of becoming hypertensive threefold (odds ratio [OR], 2.96; 95% confidence interval [CI], 1.29 - 6.81, $P = .01$) (60).

Sorensen et al. (2003) (61) found that during the first 20 weeks of pregnancy, regular participation in physical activity decreases the risk of pre-eclampsia by more than 35% (OR, 0.66; 95% confidence interval [CI], 0.47 to 0.94). Saftlas et al. (2004) (62) had self-reported data on leisure time physical activity (LTPA) from a year before pregnancy until 16 weeks gestation and found that regular physical activity may lower the risk of pre-eclampsia (OR = 0.82, 95 % CIs: 0.51, 1.31).

Table 2.5.2: Effect of exercise on pre-eclampsia

Study	Participants at baseline	Exercise assessment	Study design	Exercise intervention	Effect of exercise for reducing the key outcome
Sorensen et al. (2003) (61)	201 women with pre-eclampsia 383 normotensive women	Questionnaire – self reported activity levels 1 year pre-pregnancy and during the first 20 weeks into the prenatal period.	Case control study	In the first 20 weeks of pregnancy the risk of pre-eclampsia is reduced by engaging in regular physical activity.	Being active regularly during the first 20 weeks of pregnancy reduces the risk of pre-eclampsia by 35%. When compared with inactive women, those active during 20 weeks of pregnancy experienced a 34% reduced risk of pre-eclampsia. (OR, 0.66; 95% confidence interval [CI], 0.47 to 0.94).
Saftlas et al. (2004) (62)	44 preeclamptic; 172 gestational hypertensive; 2422 normotensive	In person interviews - based on LTPA a year before pregnancy until 16 weeks gestation	Case control study	The risk of pre-eclampsia may be reduced by engaging in regular physical activity.	Engaging in moderate physical activity showed some protective effect (OR = 0.82, 95 percent CI: 0.51, 1.31).
Spracklen et al. (2016) (63)	258 preeclamptic; 233 gestational hypertensive;	Questionnaire – self reported: type of exercise, frequency per	Case control study	The risk for pre-eclampsia may be increased by sedentary activity and there may be a	There was an association between a decrease in pre-eclampsia and an

		week, and duration spent on exercises		lower risk in developing pre-eclampsia when increasing levels of physical activity.	increase in time spent being active. (Adjusted, p for trend=0.03). Women who were active for more than eight hours a day decreased their risk of pre-eclampsia more than those who were active for four hours or less. (adjusted OR 0.58, 95% CI 0.36, 0.95).
Barakat et al. (2016) (14)	840 women. (420 exercise group) (420 control group)	Training was 3 days a week (50-55min) 85 sessions ranging from gestation week 9-11 until weeks 38-39.	Randomized control trial	Inactive pregnant women are more likely to develop hypertension three-fold.	Inactive pregnant women regardless of BMI had an increased risk of developing hypertension three-fold (odds ratio [OR], 2.96; 95% confidence interval [CI], 1.29e6.81, P ¼ .01)

2.5.3 Obesity during pregnancy

According to Colatrella et al. (2009) obesity is a significant contributor to hypertension (5). Although obesity prevalence varies in different countries, there is an increase in maternal obesity in Africa with more than 40% of child-bearing aged women being overweight or obese (64) causing it to be a public health issue (3). This is important as women with obesity are at a increased risk of infertility and amenorrhoea (65), cardiovascular diseases, diabetes, metabolic syndrome, and cancers (66). Maternal obesity leads to a higher prevalence of foetal macrosomia and obesity (63) and it can impact the foetal development and health of the child later in life (67).

Studies have shown an increase in weight retention in the 6 months postpartum period which is caused by the decline in physical activity during the second trimester (7,9). Additionally, a higher body mass index during pregnancy increases the probability of maternal and foetal adverse outcomes such as caesarean delivery and prolonged labour (7,9).

Pregnancy weight goals should be set according to Davies et al. (2010) (see Table 2.5.3), when the woman is at her healthiest before pregnancy (67) as obesity during pregnancy can lead to obesity in the future (68).

Table 2.5.3: Revised guidelines from 2009 Institute of Medicine (IOM) recommendations on weight gain during pregnancy (67)

Pre-pregnancy BMI	Recommended weight gain during pregnancy
Underweight <18.5 kg/m ²	12.5 kg – 18.0 kg
Normal 18.5 – 24.9 kg/m ²	11.5 kg – 16.0 kg
Overweight 25.0 – 29.9 kg/m ²	7.0 kg – 11.5 kg
Obese ≥ 30 kg/m ²	5.0 kg – 9.0 kg

Once an obese woman conceives the following needs to be monitored and managed throughout the pregnancy until after childbirth; congenital abnormalities, gestational diabetes, pre-eclampsia, stillbirth, deep vein thrombosis, wound infection and caesarean delivery (65).

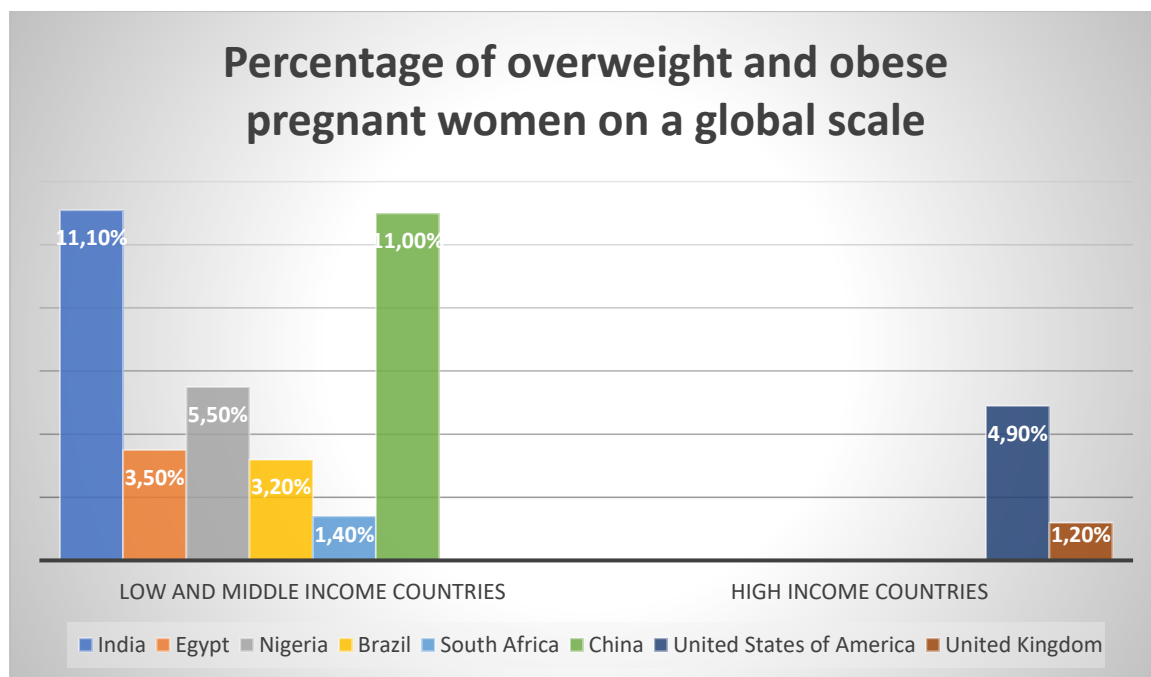


Figure 2: Represents the percentage of overweight and obese pregnant women on a global scale in LMIC (India, Egypt, Nigeria, Brazil, South Africa and China) vs HIC (USA and UK) in 2014 (69).

Chen et al. (2018) estimated that in 2014 there were more than forty million overweight or obese pregnant women in the world and that 70% were from upper middle-income countries and lower middle-income countries (69). As seen in figure 2 when comparing the economic statuses of the countries, India, Egypt, Nigeria, Brazil, South Africa and China are lower and middle-income countries (LMIC), the USA and the UK are high income countries (HIC). Most of the LMIC have a higher percentage of overweight and obese pregnant women when compared to the HIC.

2.5.4 Caesarean deliveries

Bungum et al. (2000) found that sedentary women were more likely (4.5 times) (95% CI = 1.2-16.2; $p = .023$) to undergo a caesarean section than active women (70). Therefore, the risk of caesarean delivery can be reduced by 15% and GWG by an average of 1kg by engaging in $\geq 50\%$ of pre-pregnancy activity level of aerobic or resistance exercises during pregnancy (71).

2.6 Barriers of exercise during pregnancy

A literature review of quantitative and qualitative data was done by Coll et al. (2017) and found that barriers to exercise during pregnancy on an interpersonal level included the lack of advice, lack of accessible information on exercise during pregnancy and the lack of support, such as a person to exercise with or family disapproval of exercise. Lack of resources such as transport, cost of facilities and safe environments to exercise, including the weather were also reported to be barriers (18).

Foxcroft et al. (2011) found that younger, more educated women exercised throughout their pregnancy into their third trimester. Women were more likely to exercise early in their pregnancy if they experienced no health-related variables (72). They also found that health-related variables such as a low pre-pregnancy BMI (73), history of a miscarriage, lack of lower back pain and nausea, were the predictors for exercise in the early stages of pregnancy and sociodemographic variables such as higher education were predictors of exercise later in the pregnancy (72).

2.7 Midwives beliefs and attitudes towards physical activity during pregnancy

Prenatal care providers such as obstetrician/ gynaecologists believe that physical activity, weight gain and nutrition play an important role in a healthy pregnancy (74). Thus, midwives in South Africa have a comprehensive scope of practice ranging from health assessments to therapeutic activities to emergency treatments (75). Some work independently in uncomplicated pregnancies and interdependently with medical professionals in high-risk pregnancies (75).

Okafor and Goon (2021) found that midwives in South Africa lack knowledge about being active during pregnancy and that they lack the resources to provide evidence based knowledge which presumably was not offered to them during midwifery training (76).

2.8 Research gaps

A lack of counselling by healthcare workers on GWG proves problematic as the pregnant women develop their own expectations and struggle to know when they are overweight (22). The Stengel et al. (2012) study demonstrated that obese and overweight pregnant women received limited advice regarding exercise during pregnancy, how much weight they should

gain or were told to gain too much weight. For instance, pregnant women were advised to not increase exercise intensity beyond what was done before pregnancy, however those who were physically inactive before pregnancy perceived this as to not exercise at all (22). This may result in them seeking information that may not be scientifically sound.

Women seem to desire the support of midwives to be available and, provide continuous care from pregnancy to birth as they believe that having a midwife who knows their history and who is trustworthy is important (77). However, there are barriers for the midwives to provide this care such as; lack of transport, lack of flexibility in health care systems; organisational and institutional barriers such as; shortages in the workforce, invisibility in practice and regulation and an unclear image of what midwifery is, and medical dominance which makes it very difficult to provide continuous care (77).

Previous research shows that prenatal care providers lack the training and knowledge related to weight management and diet, which leads to them gaining a reactive approach to their patients as they are unsure with how to approach assessment and counselling; avoiding it as to not offend the patients (74). Women would be more receptive to help from midwives as they are perceived to be more likely to advise on what exercises to avoid and what exercises to do making their opinion valuable (22). Midwives should therefore ensure that pregnant women are informed on what exercises they can do to make them feel safe while being active (51).

Therefore, it is clear from the literature that physical activity for pregnant women without complications has several benefits. Research shows that a low percentage of prenatal women do not engage in the recommended amount of physical activity even though studies have evidence of the benefits. A systematic review on randomized controlled trials reported that medical professionals are trying to promote physical activity behaviour change strategies, with the most common strategy being physical activity counselling with and without brochures (78). During interventions face-to-face feedback; goal setting and planning can be an important behaviour change technique to increase adherence to physical activity (36).

Not all pregnant women have the same circumstances, resources available, preferences and values which will need to be considered by the obstetric care provider when making decisions (44). Without additional support and advice it may be difficult for pregnant women to follow the

physical activity guidelines, therefore care providers should consider the costs and perceived barriers to prenatal physical activity (44). Socio demographic variables are shown to be predictors of exercise (17), as these are modifiable they can be targeted by interventions (18).

However, many women may not know of the benefits due to lack of advice and support from the families, friends and health care providers. These attitudes can be changed by effective and knowledgeable counselling from well-trained midwives. Midwives' potential should be maximised as they promote health for women, child/ren and communities even when resources are limited (79). It has been shown that South African women are unaware of the attitudes and beliefs towards exercise during pregnancy within the pregnant and midwives communities, which is therefore crucial if we are to promote this important health initiative.

2.9 Theoretical framework

A deductive logic approach was used in this study (82) within the theory of planned behaviour (TPB). This involves three main sections, namely behavioural beliefs (what is believed to be the consequence to the behaviour), perceived behavioural control (perceived control of the behaviour will increase the likelihood of the behaviour) and subjective norms/ normative beliefs (behaviour that is influenced by social pressure or the belief that others want them to engage in it) (83). The theory of planned behaviour provides a framework in which the different determinants of physical activity can be understood in order for researchers to develop physical activity interventions (42). This theoretical framework was used to create themes and subthemes.

2.10 Conclusion

Physical activity has many positive physical, emotional and psychological effects during pregnancy. Unless contraindications are present, then a clinical examination would be advised before engaging in physical activity. There are many cultural beliefs surrounding physical activity and pregnancy which is why this study is important. As it can aid in the development of interventions aimed at educating those with negative views and beliefs regarding being physically active during pregnancy.

Chapter 3: Methodology

3.1 Introduction

This section presents a description on the methods that were used to conduct this study. This following section includes: Research method and design, population and sampling, research setting, research instruments, data collection procedures, data analyses and ethics.

3.2 Research method and design

This study used a qualitative study design grounded in the theory of planned behaviour with the use of interviews and focus groups. One-on-one interviews were conducted in-person and/or using mobile applications to connect with participants using video calls, such as the video call option on WhatsApp.

3.3 Population and sampling

This study included two population groups of interest, midwives (n=12) who were trained to provide care and support to pregnant women; and pregnant women (n=10). Practicing, qualified midwives were recruited from hospitals in Johannesburg and the pregnant participants from the midwives. Midwives from all ages and pregnant women above the age of 18 years were invited to participate in the study.

Participants were recruited through purposive sampling between December 2020 and March 2021. Purposive sampling was used to include a homogenous group of midwives and pregnant woman. Data collection was modified due to COVID-19 regulations (80). This resulted in many lockdowns being initiated around the world. Due to the lockdown that was in place, some focus groups and one-on-one interviews had to be held virtually or one-on-one to allow for social distancing. This was at the preference of the participant. At the end one focus group was held consisting of 4 pregnant women and 18 one-on-one interviews were held consisting of 12 midwives and 6 pregnant women.

Permission was granted by the hospitals where the midwives work. After applying the inclusion and exclusion criteria, purposive sampling was used to include a representative group of midwives and pregnant women from hospitals in Johannesburg (81). The pregnant participants were recruited through the midwives, this allowed for researchers to gain more information regarding the beliefs and attitudes towards physical activity during pregnancy as

the pregnant participants were at different stages in their pregnancies. The midwives were contacted via email by the master's student and invited to participate in this study. Pregnant women were approached in the hospitals and invited to participate in this study. Midwives and pregnant women completed an information sheet (Appendix A and B), signed an informed consent form and a permission to audio record form (Appendix C) and gave verbal consent when performing the video call before participating in the study.

Data saturation was reached after the twelfth interview with the midwives and the tenth interview with the pregnant participants. Data saturation is reached when there are no new emerging themes in the data (84).

3.3.1 Inclusion and exclusion criteria for pregnant women

a. Inclusion criteria

- Pregnant women living in Johannesburg, South Africa
- English speaking pregnant women

b. Exclusion criteria

- Pregnant women <18 years

3.3.2 Inclusion and exclusion criteria for midwives

a. Inclusion criteria

- Practicing midwives of all ages

b. Exclusion criteria

- Qualified and registered midwives operating outside of Johannesburg

3.4 Research setting

All one-on-one interviews were conducted virtually or in a private setting. The private setting included two hospitals in Johannesburg. The first hospital setting was in a quiet private room at the end of a passage. The second setting was in the manager's office which was close to the reception area of the ward.

3.5 Research instruments

The focus group and one-on-one interviews were guided by the use of interview guides (see Appendix D and E). The pregnant women's interview guides provided information on what is important for a healthy pregnancy, what is understood by the term's physical activity and exercise and what programmes the pregnant women would like to see in their communities.

The midwives interview guides were made up of open-ended questions that would aid in gaining information on their understanding of the meaning of physical activity and exercise, what information or advice on being active they provide the pregnant women with and what health programmes are available in their communities.

3.6 Data collection procedure

One-on-one interviews and focus groups were carried out with both groups by use of interview guides (Appendix D and E) and virtually; by the use of WhatsApp video call or in a setting that was private and confidential. The researcher who is a qualified Biokineticist conducted all the interviews. The researcher had experience with conducting focus groups as they previously observed and assisted with them in another study. English was the preferred language that the focus groups were conducted in. A convenient time was arranged for the interviews. Before beginning the interview, the pregnant participants first completed their age, height, weight and expected due date. The midwives completed their age, years of experience and gender. Participants were invited to freely express their feelings and experience. This was done by creating a comfortable environment, and ensuring that the participant was aware that all identifying information would be kept confidential and only accessed by the researcher and supervisor.

All discussions were audio taped after obtaining permission from participants. All interviews were conducted between December 2020 and April 2021 and lasted approximately 20- 25 minutes each. The time of providing the interviewee with information on the study and the informed consent was not included in the recording time. Due to the increased risk of COVID-19 infection some of the focus groups changed to one-on-one interviews that were guided by the use of the interview guides, which were made up of several open-ended questions (Appendix D and E) so that the information that was received was relevant to the research ensuring credibility. Data collection, analysis and management of the data was carried out simultaneously.

3.7 Data analysis

Audio recorded data was transcribed verbatim by a third party and reviewed by the student to ensure that the information was accurate and relative to the study. Firstly, a formal thematic analysis was done on the data to familiarize and develop a basis under the theory of planned behaviour. Secondly, data was analysed using data analysis software (MAXQDA 2020 (VERBI Software, 2019) to identify statements that were colour coded to generate initial codes. Thirdly, the statements and codes were placed into a table format to identify the relevance of them. Forth, themes and sub-themes were then formed by combining all the relevant data and categorizing it. Fifth, the themes and sub themes were named. Lastly the quotes of the participants that were related to the research questions were added into the research paper.

3.8 Ethics

Ethical clearance was granted by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand (ethics protocol number: M200763, Appendix G). The study aimed to avoid physical and psychological harm to the participants who volunteered to participate in the research. Verbal or written informed consent (Appendix C) was provided by all the participants before taking part in the study. Members of the focus group were made aware that their identities would be known to each other and that it couldn't be guaranteed that other members would respect the confidentiality of the group. To adhere to COVID-19 regulations all interviews and focus groups were conducted with a mask and seated one metre from each participant. To avoid being bias research questions that were specific to the aims were selected. Trustworthiness was achieved by interviewing participants that varied in experience, age and stage of pregnancy. The audio recordings were transcribed by a professional transcriber, external to the study. Codes were assigned to all participants before being transcribed to protect their anonymity. All identifying data were removed by the transcriber to ensure confidentiality. The de-identified transcripts were made available to the researcher and supervisors for processing. All data and back-ups thereof are locked away and kept in folders that are password protected as applicable.

Chapter 4: Study findings

This chapter discusses the demographics of the population that was interviewed and the views of the midwives and pregnant women. These views are divided into themes and subthemes. The following main themes are categorised under the theory of planned behaviour: Behavioural beliefs and attitudes, perceived behavioural control and normative beliefs / subjective norms.

4.1 Demographics

There were 22 participants; comprising of midwives (n=12) and pregnant women (n=10) as shown in Table 4.1. Their ages ranged between 21 and 60 years. The mean BMI for the pregnant women was 26.1 kg/m² (range: 20.86 – 34.2 kg/m²). The majority of the pregnant women (70%) were in their second trimester. Sixty percent (n=8) of the midwives had been practicing as a midwife for more than 10 years. Of the interviews 8 were conducted in person and 14 interviews were done virtually.

Table 4.1: Characteristics of the midwives and pregnant women (n=22)

	Range	N (%)
Midwives (n=12)		
Age	29-60 years	
Years practicing as a midwife		
≥10		8 (66%)
0-9		4 (33%)
Pregnant participants (n=10)		
Age	21-33 years	
Weight (kg)	59-91	
BMI (kg/m ²)	20.86 - 34.2	
Height (m)	1.52-1.74	
Gestation period		

1st Trimester	1 (10%)
2nd Trimester	7 (70%)
3rd Trimester	2 (20%)

4.2 Categorized under the theory of planned behaviour approach

The participants' views and comments are displayed in italics and in verbatim quotes. They are identified using the pregnant participants BMI and the midwives' years of experience. The results were divided into sub-themes and then themes as seen in Figure 3.

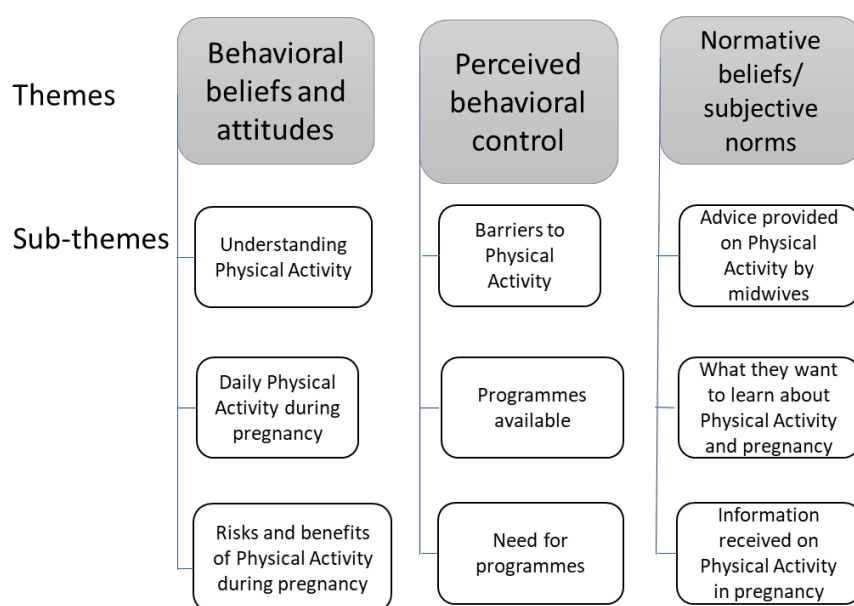


Figure 3: Sub-themes and themes

4.3 Behavioural beliefs and attitudes

4.3.1 Understanding physical activity

The pregnant women viewed physical activity as an everyday activity such as housework, looking after their other children and walking. Exercise was perceived as going to the gym and working out:

“Working out would be like exercise and physical activity I would say would be activity that you do like running after children or sweeping the floors.” (Participant 10, interview 10, setting #3, age 22, BMI 25.1 kg/m²)

“Things like physical activity just like your everyday activity. Maybe or maybe, you have another kid like me that will keep you busy, and exercise like deliberately going to exercise.” (Participant 21, interview 18, setting #3, age 23, BMI 34.2 kg/m²)

Another added:

“Physical activity like cleaning or doing things around the house and exercise like going to the gym.” (Participant 22, interview 18, setting #3, age 27, BMI 24.8 kg/m²)

Additionally, the pregnant women were aware that a healthy diet, reduced stress and exercise were important factors for a healthy pregnancy and that they were to avoid smoking and alcohol consumption due to their adverse effects.

4.3.2 Daily PA during pregnancy

The pregnant women perceived walking to be the easiest and best form of physical activity. This is expected in the South African context as with other developing countries, as there are limited resources and facilities available such as; public transport, health services, community centres, free facilities and education within their communities. Therefore, the pregnant women have to travel further out of their communities to find the resources they need:

“I walk and do yoga” (Participant 12, interview 12, setting #3, age 22, BMI 20.86 kg/m²)

Another commented:

“I go for walks, I walk my dog, and I do yoga, and Pilates. And I'll go for walks on my horse with supervision.” (Participant 20, interview 18, setting #3, age 28, BMI 22.5 kg/m²)

4.3.3 Benefits and risks of PA during pregnancy

The pregnant women and midwives viewed physical activity as beneficial during pregnancy. These benefits included, getting the body ready for labour, an increase in blood circulation and a reduction in aches and pains that are associated with pregnancy. Although all the participants were familiar with the benefits of physical activity, they were also conscious about the risks:

“If there are contraindications such as preterm labour, bleeding, that might be dangerous. Obviously, it keeps the muscles active and some of the changes in the body requires you to keep active so that your body can still function properly. And to strengthen your muscles that you are going to use during pregnancy. Strengthen the pelvic floor of a pregnant woman etcetera.” (Participant 1, interview 1, setting #1, age 35, practicing 12 years)

Another reported:

“Yes, if overdone. There are certain exercises that are not safe to do in pregnancy and I have personally seen moms they will end up on like strict bedrest, possibly go into pre mature labour because they overdid it and they injured themselves And I think moms are not always as informed about how much the body changes during pregnancy and they try and do what they did prior to pregnancy and that's when they get hurt. The other side of it is just there are certain exercises that are just completely contraindicated in pregnancy and is actually downright dangerous.” (Participant 11, interview 11, setting #3, age 21, practicing 9 years)

And another agreed:

“If there is a reason to not be physically active. I guess if you've got placenta previa then it would be harmful in a pregnancy. But otherwise, if it's not contra indicated then it is advisable that a woman continues to be physically active throughout pregnancy Yes, it does help you. It keeps the muscles toned, also the cardiac output.” (Participant 13, interview 13, setting #3, age 32, practicing 5 years)

The pregnant women reported that overdoing it or engaging in strenuous physical activity, such as lifting heavy objects and performing certain exercises should be avoided during pregnancy. Additionally, the pregnant women perceived a certain amount of weight gain to be beneficial to allow for a healthy pregnancy. They reported that being overweight and obese

during pregnancy can increase blood pressure and put strain on body organs. Furthermore, that being underweight during pregnancy can have negative effects on the foetus.

4.4 Perceived behavioural control

4.4.1 Barriers to exercise

Several barriers were discussed by the participants in this study that would affect them in participating in physical activity programmes in their communities, which therefore decreases their overall physical activity during pregnancy.

The most common intrinsic factor reported by the pregnant women was pregnancy symptoms such as morning sickness. In agreement with this the midwives mentioned fatigue during the last trimester of the pregnancy:

“When they are reaching their trimester of delivering sometimes, they get very tired and don’t feel like doing anything.” (Participant 7, interview 7, setting #2, age 30, practicing 1 year)

“Maybe just some days really not feeling 100%. You’re struggling with morning sickness but otherwise I think I should be able to attend them.” (Participant 10, interview 10, setting #3, age 28, BMI 25.1 kg/m²)”

Extrinsic barriers reported by the pregnant women and the midwives included location and transport as they were more probable to have adherence to physical activity if the classes were in close proximity to their house. This is due to safety reasons as it is dangerous for women to be walking at night or alone in South Africa:

“Because if you organize such things in the evening, it’s not safe for the woman to be walking around when it’s late at night.” (Participant 4, interview 4, setting #1, age 57, practicing 28 years)

“For a lot of people, the clinics are out of their areas. So, transport problems firstly and then times, schedules. A lot of people are not available on those certain days which the clinics are available or having the classes so yeah.” (Participant 12, interview 12, setting #3, age 22, BMI 20.86 kg/m²)”

Lack of time was also perceived to be a barrier amongst the pregnant women as some of them have full time jobs and then when they get home, they have to look after a child/ren, cook and clean.

4.4.2 Programmes that are available within the communities

Participants viewed mom's yoga and gym classes as ways to be physically active in their communities. Since the beginning of the COVID-19 pandemic there was an increase in online exercise classes to allow for social distancing. It seems that women are opting for these classes as they can be done from anywhere and at any time to suit their own schedules.

4.4.3 Programmes that are needed in the community

The pregnant women reported that they would be more inclined to receive advice from well-educated individuals that have knowledge in the field of pregnancy. They perceived group classes as being important where information on exercises that are deemed safe to do during pregnancy and ideas on healthy eating could be discussed:

"I would like exercise classes specifically for pregnant ladies with Health professionals, nutritionists, vitamin experts, anyone that has the knowledge in that field." (Participant 14, interview 14, setting #3, age 28, BMI 23.33 kg/m²)

Classes with other pregnant women where previous experiences can be shared, where questions can be asked and where partners can join; as raising a child is a partnership were brought up amongst the pregnant participants.

The midwives reported that programmes should educate on the safety of exercises during pregnancy, the advantages and disadvantages and that they should have different programmes to cater for all the trimesters:

"Obviously, it needs to cater for the different trimesters because that is the most important thing, the trimester." (Participant 1, interview 1, setting #1, age 35, practicing 12 years)

Another added:

“Actually, I want to learn more, actually the disadvantages. Especially when you’re pregnant which kind of... I know sometimes yoga is good but there are other exercises I’m not aware of that a pregnant woman can do or not do so I want to know about the disadvantages and advantages. Which one can benefit the pregnant woman and which one can be avoided.” (Participant 7, interview 7, setting #2, age 30, practicing 1 year)

4.5 Normative beliefs /subjective norms

4.5.1 The midwives advice on physical activity during pregnancy

The majority of the midwives mentioned not having any training or are self-taught on physical activity and exercise during pregnancy. Less than half of the midwives (42% n=5) mentioned doing a course on prenatal exercise in order to complete their midwife training, which for most was years ago. An encouraging finding was that the midwives were interested in furthering their knowledge in doing courses on pregnancy and exercise as part of their midwifery training.

The midwives reported prescribing aerobic exercises during the early stages of pregnancy:

“So usually, we tell them that during the first, early stages of pregnancy they can just do their walks and swim, it’s also helpful. Yeah. And they shouldn’t lift anything that’s heavy. And then when they’re about to deliver around 37 weeks also, like above 37 weeks we do encourage them to do squats because it helps with gravity to pull the baby down. Yeah. So, they do squats, they take walks, some they climb the stairs, they use the birthing ball like when they’re just home watching television, they don’t have to sit on the couch but they can sit on the birthing ball and just to mobilize their pelvis. Mobilize their pelvis yeah.” (Participant 2, interview 2, setting #3, age 36, practicing 7 years)

They advised the pregnant women to increase exercise towards the later stages of pregnancy to help with the descent of the baby, to mobilize the pelvis and to help prepare the muscles for the birth, as well as engaging in 30 minutes of exercise at least 3 times a week.

“If it’s in the early pregnancy caution with exercises, not strenuous exercises. If you are at the gym you need to talk to your gym instructor to tell you of the things. And then if contraindicated don’t exercise at all. But during the later stages of the pregnancies, you can do as much exercises as possible. It helps the baby descend, it helps the labour to be quicker and then it

also strengthens your muscles and makes it easier for you to deliver.” (Participant 1, interview 1, setting #1, age 35, practicing 12 years)

Another added:

“I recommend that they do daily walking for 15 – 30 minutes ...Depending and if they don't manage to do it every day, at least three times a week. get a ... we call it a birthing ball, demonstrate exercises that they can do to help strengthen their pelvic floor and also you know help to loosen some of the muscles in the lower portion of the abdomen in the preparation for the birth. I always demonstrate that in my classes and then both moms that enquire start things like yoga and Pilates. I do encourage them to find classes that are pregnancy friendly recommend swimming you know the ones that do like CrossFit or who are athletes with long distance running, those mommy's I council on exercise that may be harmful. we often look at what exercises they were doing before pregnancy and adjust that exercise program to be more suitable to pregnancy.” (Participant 11, interview 11, setting #3, age 21, practicing 9 years)

This midwife explained that their patients are “pregnant and not sick” and that they should continue with the level of physical activity that they were at before pregnancy and if they were inactive before pregnancy, they should start being more active during pregnancy:

“I encourage them to do the exercises because it helps for the circulation balance out dieting to be healthy, because some of the woman remember when they are pregnant, they think that when you are pregnant that you are sick. When you are pregnant, you are not sick.” (Participant 8, interview 8, setting #2, age 40, practicing 11 years)

4.5.2 What the participants are interested in learning

The midwives expressed interest in learning about the types of exercises during the different trimesters that are safe to do and those that should be avoided. The importance of offering a comprehensive programme that includes the “whole package” such as nutrition, exercises, counselling was mentioned as the pregnant women would be able to get all the information and support from a single place instead of having to travel around:

“Obviously it needs to cater for the different trimesters because that is the most important thing, the trimesters.” (Participant 1, interview 1, setting #1, age 35, practicing 12 years)

“How safe it is, some of the activities. Like you get some women they are gym fanatics and they fall pregnant and they want to continue going back to the gym and during pregnancy and

all that. Personally, I think it isn't safe because the things that they do at the gym they are tough like they want to be like that strong guy. The safety of the exercises is important.” (Participant 2, interview 2, setting #3, age 36, practicing 7 years)

Additionally:

“They can include nutrition as well, antenatal classes, exercises, like give it as a whole package whereby the mother doesn't have to run from the antenatal class to the birthing class to the yoga class. So, have it like be one compact package whereby you know that oh, on this day this is what we're doing, on the following day we're doing something else. But going to the same place like the same service provider for that.” (Participant 13, interview 13, setting #3, age 32, practicing 5 years)

4.5.3 Information that the pregnant women received on physical activity

Most of the pregnant women indicated that they received prenatal physical activity guidelines from healthcare practitioners. Due to the lack of trust in their health care providers approximately forty percent of the pregnant women admitted to conducting extra research on pregnancy and exercise through Google, information pamphlets and pregnancy books. Less than half (40%, n=4) indicated that they received information from family and friends regarding exercise during pregnancy from their own experiences:

“Besides Google the midwife does give you guidelines.” (Participant 10, interview 10, setting #3, age 28, BMI 25.1 kg/m²)

“I've been told that physical activity is very good, especially for me to be walking every day from my midwife however, I did Google a lot of it.” (Participant 14, interview 14, setting #3, age 28, BMI 23.33 kg/m²)

The pregnant women mentioned receiving information on physical activity during pregnancy such as 'keep moving' around or 'walk'. This information was given either from health professionals or from the internet. However, contradictory to the previous sentence some pregnant participants were advised by their grandparents to not exercise at all during pregnancy.

The general consensus on the frequency of pregnancy exercise classes in both the midwives and the pregnant women was three times a week. Some midwives went as far as stating that the pregnancy classes should be as often as those that aren't pregnant.

4.6 Conclusion

Table 4.6.1 Key findings in the study

Objectives	Key findings
To determine the attitudes, beliefs and practices of midwives towards physical activity during pregnancy	Physical activity and exercise were viewed by the midwives as important for a healthy pregnancy especially when no contraindications were present.
To determine the attitudes, beliefs and practices of pregnant women towards physical activity during pregnancy	Physical activity and exercise were viewed by the pregnant women as crucial for a healthy pregnancy and should be done a minimum of three times a week.

The pregnant women viewed physical activity and exercise as beneficial and crucial for a healthy pregnancy especially in the absence of contraindications. They believed that physical activity and exercise, especially walking, should be done a minimum of three times a week and at a low to moderate intensity. The pregnant women reported that they were more likely to take physical activity advice from knowledgeable, well-educated individuals that have experience in the field of pregnancy than doctors, as they described them as being 'cold'. The pregnant women expressed interest in holistic pregnancy classes.

Similarly, the midwives in this study perceived exercise and physical activity to be important for a healthy pregnancy in the absence of contraindications. The midwives expressed interest in physical activity and pregnancy; learning about what exercises can be done throughout the different trimesters, the advantages and disadvantages of certain exercises during pregnancy and how to individualise physical activity programmes dependent on individuals. They felt that their midwifery curriculum did not include enough information about physical activity and would find it beneficial if it was added into future midwifery programmes.

Muzigaba et al. (2014) conducted a study on the perceived role and influencers of physical activity among pregnant women from low socioeconomic status communities in South Africa and found that 44% of South African pregnant women were physically inactive. This study is important as it highlights why South African pregnant women are physically inactive, what role the midwives play in increasing levels of physical activity during pregnancy and how to increase pregnant women's adherence to exercise.

Chapter 5: Discussion

5.1 Introduction

This section focuses on the discussion of the findings. It is made up of: acceptability of physical activity during pregnancy, barriers to physical activity during pregnancy, promotion of behaviour change in the communities, limitations of the study, conclusion and future recommendations.

5.2 Acceptability of physical activity during pregnancy

The attitudes towards physical activity were positive in this study which is common with other findings, where the pregnant women requested more information and interventions as they were interested in participating in physical activity during pregnancy (85) (26). Canella et al. (2010) found that these women were more likely to have a higher household income, living with their partner and were better educated. Similarly, the pregnant women in this study were portrayed to be well educated and have higher incomes. The participants emphasized the importance of diet, reduced stress, engaging in exercise, avoiding alcohol consumption and smoking for a healthy pregnancy which is consistent with Watson et al. (2016), where the participants were conscious of the importance of implementing a healthy lifestyle during pregnancy; such as rest, diet and healthy living (42). Physical activity was recognised as daily activities and exercise as a gym routine. Walking and household chores such as; sweeping and cleaning the house were often reported forms of physical activity as stated in other studies where physical activity is described as occupational and household tasks (42) (43).

Walking was the preferred form of physical activity reported by the pregnant women, as in previous research (42) (43). This may be due to the fact that the participants would be likely to walk to their nearest transport centre or town; due to the lack of facilities such as clinics or health centres within their communities. Walking is a popular activity that can easily be part of a daily routine (86). Therefore, interventions should be centred around walking, when intended at increasing physical activity levels before, during (87) and after pregnancy.

The midwives all cautioned against exercise when contraindications were present such as; preterm birth, bleeding, and placenta praevia which is comparable to the contraindications that 91% of the midwives reported in the study done by Hopkinson et al. (2018). For these reasons clinical assessments should be conducted before doing any form of physical activity during pregnancy.

Lifting heavy objects or moving heavy objects were deemed as dangerous activities during pregnancy. There was fear that if the objects or the pregnant women had to fall, they would injure themselves. Additionally, engaging in strenuous exercise like weight lifting was also cautioned against because it could lead to bedrest in the hope that the pregnant women would reduce levels of activity to lower the risk of preterm labour or other pregnancy complications. Therefore, the midwives should provide the pregnant women with more information on what exercises can be done throughout pregnancy and the prenatal care period.

Despite the beliefs on the benefits of exercise in this study, during the prenatal period many women still remain inactive (17) (88). Therefore, policymakers should develop interventions that educate participants on the benefits and risks of physical activity during pregnancy which may influence their perceived barriers (89). These interventions should target women who are in their child-bearing years, inactive and non-pregnant (17). The outcome of these interventions should aim to keep pregnant women active throughout the pregnancy (17).

5.3 Barriers to physical activity during pregnancy

Pregnancy related intrinsic barriers to physical activity include; morning sickness and increased fatigue which is similar with the study done by Duncombe et al. (2009), where participants felt tired and unwell. Another study reported that time was a common barrier to exercise, as in this study which was reported by the participants as they have full-time jobs or other children at home (87). Additionally, in other studies social, physical and psychological barriers were indicated which discourage being active during pregnancy (42,90).

Like the study done by Muzigaba et al. (2014) who conducted research on the perceptions and experiences of pregnant women on physical activity and pregnancy at Vanguard Community Health Centre located in the Western Cape. Sociocultural beliefs and attitudes about body image was not reported as a barrier to physical activity in this study. This may be due to the fact that they prioritize their health and the foetus' health over their own sociocultural beliefs. Contradictory to the above, set in a similar setting black women perceived being underweight with having HIV/AIDS (91).

Health providers should discuss the latest information on pregnancy and exercise with the pregnant women so that they can make an informed decision on improving their health and lifestyle (92). These discussions should be focused on the women's barriers to exercise such as scheduling exercise later in the day, doing a home programme (93) and finding a safer place for the pregnant women to carry out these programmes (92). This may aid in the pregnant women overcoming these perceived barriers (89) thus increasing physical activity levels.

5.4 Promotion of behaviour change in the community

There were conflicting answers when questioned about the exercise programmes that were available for the pregnant women in the community as some midwives were unaware of any. When questioned about where they stay these midwives stayed in townships, there seemed to be a lack of classes in the townships when compared to urban suburbs. However, in contrast to this the other midwives and pregnant participants were aware of online programmes, gym classes and yoga classes specifically designed for pregnant women.

From the beginning of the COVID-19 pandemic exercise classes changed to online classes which during the pandemic allowed for people to be active while social distancing, from their own homes or spaces. These online classes have increased over the course of the pandemic and now there is a range of online classes to choose from such as; yoga, step classes, grid classes, one-on-one sessions and Pilates which is more accessible for many South African women. This could allow for more women to take part in these classes as they can be done from anywhere at any time as long as they have access. However, this requires smart devices, data and internet connections, which may not be available to all pregnant populations.

Group pregnancy classes where healthy eating, types of exercises that can be done and discussions on previous experiences was a popular request by the pregnant participants. Additionally, Kieffer et al. (2002) found that their participants recommended wanting centre-based activity programmes where physical activity and a range of other activities can be held. Watson et al. (2016) suggested that participating in group physical activity during pregnancy may motivate a change in one's lifestyle habits and behaviours (42).

The midwives expressed interest in furthering their training which is consistent with the study done by Owusu-Addo (2015). They were interested in learning about the do's and don'ts of exercise during pregnancy and the form and exercise techniques (61). Hence, training should be provided for health care workers to be able to conduct exercise classes (62).

Bauer et al. (2010) reported that >61% of health care providers spent only 5-10 minutes educating patients on exercise. This lack of time spent or limited knowledge can decrease pregnant women's physical activity and their trust in the health care provider (94). Thus, health care providers have a very important role in providing the women with information on physical activity during pregnancy as they are seen regularly (93).

The midwives in this study prescribed aerobic exercises during the beginning stages of pregnancy. Towards the end of the pregnancy, the midwives prescribed exercises that would advance labour such as; exercises that helped with the descent of the baby, exercises to mobilize the pelvis and prepare the muscles for birth. Even though certain exercises were prescribed, the midwives failed to recommend the duration, frequency and intensity of the exercises which is consistent with the finding in the study done by Hopkinson et al. (2017) (95). The midwives were also unaware of the safe weight gain limitations for pregnancy which is comparable to the study done by Arrish et al. (2014), where 35 midwives were examined and reported that they had poor knowledge in recommending weight gain and recommended energy requirements during pregnancy.

Women whom are active before becoming pregnant are more likely to continue with being active throughout their pregnancy therefore interventions should be aimed at increasing the activity levels of non- pregnant women (17). Setting goals, (67) physical activity education and promotion (60) (70) is important as many still have inaccurate perceptions of physical activity during pregnancy (65). Additionally, low education and income are factors that contribute to inactivity thus the health care providers should be aware of this and should take that in to consideration when designing an intervention (9). The information should be personalized to the specific requirements of the pregnant women at different stages of the pregnancy (17) (61).

A South African study done by Muzigaba et al. (2014) suggested the use of instructional DVDs, posters and brochures in clinics to promote physical activity. Similarly, appropriate facilities that are safe may encourage physical activity participation during pregnancy as well (86) (64) (67). The interventions can be carried out by community workers, volunteers or health workers in the area. These health workers should be educated on exercise and pregnancy and should either deliver one-on-one education to the pregnant women at their homes or should conduct classes in the community centres for pregnant women that would allow many more women to attend extending the reach of the interventions.

5.5 Limitations

The midwives and pregnant women interviewed were from private hospitals in Johannesburg which may not be a full representation of other communities. The exclusion of other midwives limits our understanding of the perspectives on physical activity during pregnancy by a vast majority in South Africa. Despite these limitations it is believed that the data and information received from the participants was reliable and truthful. Therefore, the data received and results from this study can be used to develop interventions aimed at increasing physical activity during pregnancy.

5.6 Conclusion

This study highlights the need for education on physical activity during pregnancy for both midwives and pregnant women, as the benefits associated with being active during pregnancy substantially offsets the risks and there seems to be a lack of knowledge on this.

In South Africa and other LMICs there is a lack of access to resources such as clinics and hospitals that are equipped to educate the pregnant women on being active during pregnancy. Incorporating extrinsic barriers into the interventions could allow for a higher prevalence of individuals becoming active. Training should be provided for the midwives in their midwifery training with the continuation of professional education, to improve their knowledge and ensure that the advice and information they are providing is reliable, accurate and up-to-date.

Therefore, the interventions should be culturally sensitive, offer a holistic approach, be included in the midwifery programmes, be accessible and should be aimed at including family members of the pregnant women which will in turn increase social support.

5.7 Recommendations for further investigation

- 1) The evidence on understanding the objective measures and self-reported measures of physical activity patterns of pregnant women in South Africa and other LMICs is limited and should be investigated.

- 2) The lack of physical activity and pregnancy programmes in the midwifery curriculum should be investigated and addressed.

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6. Appendices

6.1 Appendix A - Research Information Sheet: PREGNANT WOMEN

Good day, my name is Genevieve Koellner. I am a student at the University of The Witwatersrand currently doing my degree of Master of Science in Medicine in Sports and Exercise Science Dissertation. I would like to invite you to consider participating in my research study, entitled “The attitudes and beliefs of pregnant women and midwives towards physical activity during pregnancy”. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. The information leaflet is to help you decide if you would like to participate. Please take time to read the following information carefully and discuss it with others if you wish. Please ask questions if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

Study title: The attitudes and beliefs of pregnant women and midwives towards physical activity during pregnancy

Invitation paragraph

This research is focused on pregnant women and midwives’ attitudes and beliefs on exercise. But for us to do that, we need to understand why women exercise, why they find it hard to exercise, and how can the midwives improve that. That is why we would like to invite you to help us answer some of these questions.

Where will the research be conducted?

All focus groups and one-on-one interviews will be conducted virtually or in a private hospital setting. I will be assisted by trained and experienced research assistants when conducting the focus groups. The participants in the face-to-face focus groups will receive refreshments on the day and those that are interviewed virtually will be reimbursed for their data if requested.

What is the purpose of the research?

The aim of this study is to determine the attitudes and beliefs that pregnant women and registered midwives have towards physical activity during pregnancy.

Patient selection

We are inviting pregnant women to participate in this study. You may have been invited because you already attend an exercise programme, or because you know someone involved or participating in this research project. You may have also been invited through your midwife at your clinic.

Do I have to take part?

Your participation is voluntary. I would like you to consent to participate in this study as we believe that you can make an important contribution to the research. If you decide to take part you are still free to withdraw at any time. Your withdrawal will not affect your access to other medical care.

What would I be asked to do if I took part?

If you are happy to participate in the research, I will ask you to read this information sheet and sign the consent form. You will be invited to take part in a small discussion group. The group will consist of 5 - 9 pregnant women, who will be asked several open-ended questions regarding their pregnancy and exercise habits. The discussions will be approximately 30 – 45 minutes long and will continue until saturation is reached within the groups. These discussion groups will help me understand your feelings and thoughts regarding your pregnancy and physical exercise. Our discussions will be audio or video taped to help me capture your insights in your own words. Therefore, your information and feelings shared may not be anonymous; however, the tapes will only be heard by me and the transcriber for the purposes of this study, and will be kept in the strictest confidence. The audio recordings will be destroyed after 5 years. Direct quotes from you may be used in a published paper, however, your name and other identifying information will be kept anonymous.

Risks or side effects

There are no side effects for taking part in this study.

Benefits

There are no direct benefits to participating in this research project.

What happens to the data collected?

The discussions will be recorded to be transcribed later, therefore the information shared may not be anonymous. However, the tapes will only be heard by the researcher and the transcriber, and will be kept in the strictest confidence. Information gained during the research will be used as part of a larger sample, and will remain anonymous. The outcomes of the research will be available in one or more of the following sources: scientific papers in peer reviewed academic journals, presentations at a regional conference, local seminars.

Who to contact?

If you have any questions, you may ask them now or later, even after the study has started. If you wish to ask any questions, you may contact the following person

For study related enquiries:

Genevieve Koellner

Cell – 084 962 5202

Email- genevievekoellner17@gmail.com

For ethics complaints:

Prof. Clement Penny

Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC), which is an independent committee established to help protect the rights of research participants

Tel: (011) 717 2301

Did the participant raise any questions? ☐ **YES** / ☐ **NO**

If YES – What were they:



6.2 Appendix B - Research Information Sheet: MIDWIVES

Good day, my name is Genevieve Koellner. I am a student at the University of The Witwatersrand currently doing my degree of Master of Science in Medicine in Sports and Exercise Science Dissertation. I would like to invite you to consider participating in my research study, entitled "The attitudes and beliefs of pregnant women and midwives towards physical activity during pregnancy". Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. The information leaflet is to help you decide if you would like to participate. Please take time to read the following information carefully and discuss it with others if you wish. Please ask questions if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

Study title: The attitudes and beliefs of pregnant women and midwives towards physical activity during pregnancy

Invitation paragraph

This research is focused on pregnant women and midwives' attitudes and beliefs on exercise. But for us to do that, we need to understand why women exercise, why they find it hard to exercise, and how can the midwives improve that. That is why we would like to invite you to help us answer some of these questions.

Where will the research be conducted?

All focus groups and one-on-one interviews will be conducted virtually or in a private hospital setting. I will be assisted by trained and experienced research assistants when conducting the focus groups. The participants in the face-to-face focus groups will receive refreshments on the day and those that are interviewed virtually will be reimbursed for their data if requested.

What is the purpose of the research?

The aim of this study is to determine the attitudes and beliefs that pregnant women and registered midwives have towards physical activity during pregnancy.

Participant selection

You are being invited to participate in this study because you are a registered midwife. You may have been invited because you are working in a community, or maybe you already run or are involved in a pregnancy programme.

Do I have to take part?

Your participation is voluntary. We would like you to consent to participate in this study as we believe that you can make an important contribution to the research. If you decide to take part you are still free to withdraw at any time. Your withdrawal will not affect your access to other medical care.

What would I be asked to do if I took part?

If you are happy to participate in the research, I will ask you to read this information sheet and sign the consent form. You will be invited to take part in a small discussion group. The group will consist of 5 -9 midwives and this will continue until saturation is reached within the groups. The discussions will be guided by several open-ended questions and will be approximately 30 – 45 minutes long. These discussion groups will help me understand your feelings and thoughts regarding your beliefs of pregnancy and physical exercise. Our discussions will be audio taped to help me capture your insights in your own words. Therefore, your information and feelings shared may not be anonymous; however, the tapes will only be heard by me and the transcriber for the purposes of this study, and will be kept in the strictest confidence. The audio recordings will be destroyed after 5 years. Direct quotes from you may be used in a published paper, however, your name and other identifying information will be kept anonymous.

Risks or side effects

There are no side effects for taking part in this study.

Benefits

There are no direct benefits to participating in this research project.

What happens to the data collected?

The discussions will be recorded to be transcribed later, therefore the information shared may not be anonymous. However, the tapes will only be heard by the researcher and the transcriber, and will be kept in the strictest confidence. Information gained during the research will be used as part of a larger sample, and will remain anonymous. The outcomes of the research will be available in one or more of the following sources: scientific papers in peer reviewed academic journals, presentations at a regional conference, local seminars.

Who to contact?

If you have any questions, you may ask them now or later, even after the study has started. If you wish to ask any questions, you may contact the following person

For study related enquiries:

Genevieve Koellner

Cell - 084 962 5202

Email – genevievekoellner17@gmail.com

For ethics complaints:

Prof. Clement Penny

Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC), which is an independent committee established to help protect the rights of research participants

Tel: (011) 717 2301

Did the participant raise any questions? **YES / NO**

If YES – What where they:

6.3 Appendix C - Informed Consent

Informed Consent

- I hereby confirm that I have been informed by the researcher, Genevieve Koellner about the nature, conduct, benefits and risks of the clinical study called '***The attitudes and beliefs of pregnant women and midwives towards physical activity during pregnancy***'
- I have also received, read and understood the above written information (Participant Information Leaflet, Audiotaped Consent and Informed Consent) regarding the clinical study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by Genevieve Koellner or on their behalf.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

PARTICIPANT:

Printed Name Signature / Mark or Thumb print / Date and Time

RESEARCHER:

I, Genevieve Koellner, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Printed Name / Signature / Date and Time

TRANSLATOR/OTHER PERSON EXPLAINING INFORMED CONSENT (DESIGNATION):

Printed Name / Signature / Date and Time

WITNESS (If applicable):

Printed Name / Signature / Date and Time

7 York Road

Room 4L17

Parktown

2193

Tel: 011717-2701 or 2198

CONSENT TO AUDIO RECORD FOCUS GROUP INTERVIEWS

I have read or understood the project information sheet, and I understand that it is up to me whether or not the interview is audio. It will not affect in any way how the interviewer treats me if I do not want the interview to be recorded.

I understand that if the interview is recorded that the tape will be destroyed after 5 years.

I understand that I can ask the person interviewing me to stop recording, and to stop the interview altogether, at any time.

I understand that the information that I give will be treated in the strictest confidence and that my name will not be used when the interviews are typed up.

☐ Yes, I give my permission for the interview to be recorded

☐ No, I do not give my permission for the interview to be recorded

PARTICIPANT:

Printed Name Signature / Mark or Thumbprint Date and Time

RESEARCH ASSISTANT:

Printed NameSignatureDate and Time

6.4 Appendix D - Qualitative Interview Guide (Pregnancy)

1. What do you think is important for a **healthy pregnancy**?
 - a. What information have you received to help you be healthy during your pregnancy
 - i. Who provided you with this information?
 - ii. What makes you trust / not trust this information?
 - iii. What questions would you have wanted / had answered at the clinic?
 - iv. What was your experience of being provided advice at the clinic
 1. Did you feel respected? Cared for?
 - b. What role do you think weight and weight gain plays in a healthy pregnancy?
 - c. What programmes are available in your community to help you be healthy?
 - d. What support do you currently have to be healthy?
2. What do you understand by the term “**physical activity**” and “**exercise**”?
 - a. Think about all the ways women can be physically active. Name a few.
 - b. What have you been told about being physically active or exercise during pregnancy?
 - i. Who told you this information?
 - ii. Where do you go to find out information about exercise during pregnancy?
 - c. How do you think it might hurt your pregnancy?
 - d. How do you think it might help your pregnancy?
 - e. How important is it to you to be physically active while you are pregnant?
 - f. What kinds of things do you do to be physically active?
3. What kind of **pregnancy programmes** would you like to see in your community to help you become healthy?
 - a. To promote physical activity
 - b. Who would you like to deliver these programmes
 - c. How often should these programmes run
 - d. What should be included in the programme (i.e. exercises, talks, educational booklet)
 - e. What would make it easier for you to attend these programmes?
 - f. What would make it hard for you to attend these programmes?

(Weir et al 2010; Krans & Chang, 2012; Evenson et al 2009; Downs & Hausenblaus, 2004)

6.5 Appendix E - Qualitative Interview Guide Midwives

1. What do you understand by the term “**physical activity**” and “**exercise**”?
 - a. Think about all the ways women can be physically active. Name a few.
 - b. How do you think being active may be harmful during pregnancy?
 - c. How do you think being active may be helpful during pregnancy?
 - d. How important is it to be physically active during pregnancy?
2. What **information/advice** do you give pregnant women about being active during their pregnancy?
 - a. What training have you received around pregnancy and exercise
 - b. What training would you like to receive around pregnancy and exercise
 - c. What kinds of things would make it easier for you to give such advice?
 - d. What kinds of things make it hard for you to give advice?
 - e. What do you do if you get a physical activity question that you can't answer? What steps do you take?
3. What kind of **health programmes** are available for pregnant women in your community?
 - a. Who runs these programmes? Who should run these programmes
 - b. What skills do you think are needed to run these programmes?
 - c. Why do you think these programmes are running? What need is there? OR
 - d. Why do you think no programmes are running? What stops them from running?
 - e. What kinds of things are needed for these programmes to be a success?
 - f. What kind of things will make it hard for pregnant women to attend these programmes?
 - g. How often is/should these programmes run
 - h. What is/should be included in the programme (i.e. exercises, talks, educational booklet)

6.6 Appendix F: Data Sheet

DEMOGRAPHIC DATA			
Study Number		Date	
Pregnant participants			
1) Age		2) Maternal height	
3) Current weight		4) Estimated due date:	DD/MM/YY
Midwives			
1) Age		2) Gender	Male / Female
3) Number of years working as a midwife			

6.7 Appendix G: Ethical Clearance Certificate



R14/49 Miss Genevieve Koellner

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M200763 MED20-03-074

NAME: Miss Genevieve Koellner
(Principal Investigator)
DEPARTMENT: Centre for Exercise Science and Sports Medicine
Parklane, Gardens, Morningside and
Tenderloving Childbirth
PROJECT TITLE: The attitudes and beliefs of pregnant women and
midwives towards physical activity during pregnancy
DATE CONSIDERED: 31/07/2020
DECISION: Approved unconditionally
CONDITIONS:
SUPERVISOR: Prof Philippe Gradidge and Prof Dimitri Constantinou
APPROVED BY: 
Dr C Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL: 14/08/2020

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Philip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed July and will therefore be due in the month of July each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

6.8 Appendix H: Turnitin Report

