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Chloe Walker B.Sc. (Hons).

**WOMEN'S EXPERIENCES OF PHYSICAL
ACTIVITY DURING PREGNANCY**

Section A: Women's Perceptions of the Psychosocial Barriers
to Physical Activity during Pregnancy: A Review of the
Literature

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Section B: Women's Experiences of Physical Activity during a
Pregnancy Resulting from In Vitro Fertilisation Treatment: An
Empirical Study

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A thesis submitted in partial fulfilment of the requirements of Canterbury
Christ Church University for the degree of Doctor of Clinical Psychology

JUNE 2015

SALOMONS

CANTERBURY CHRIST CHURCH UNIVERSITY

CANTERBURY CHRIST CHURCH UNIVERSITY
Doctorate in Clinical Psychology (D.Clin.Psychol.)

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Summary of the MRP Portfolio

Section A contains a literature review which critically evaluates existing empirical and theoretical research into women's perceptions of the psychosocial barriers to physical activity during pregnancy. Research fell into eight broad categories including intention, self-efficacy, motivation, risk misperceptions, lack of or conflicting information, social and emotional support, cultural norms, and social modelling. Gaps in the literature and suggestions for future research are discussed. These include further qualitative research into the experiences of physical activity for specific populations of women, including those who have undergone fertility treatment.

Section B is a qualitative study describing eight women's experiences of infertility and subsequent decision-making about engaging in physical activity during a pregnancy resulting from in vitro fertilisation treatment. Interpretative phenomenological analysis of the interview data revealed three superordinate themes related to navigating away from childlessness and towards motherhood, negotiating a safe passage during pregnancy, and balancing the challenges of pregnancy with the needs of the self. Findings are discussed in relation to previous literature, and implications for clinical practice and future research are considered.

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Major Research Project
Section A: Literature Review

Women's Perceptions of the Psychosocial Barriers to Physical
Activity during Pregnancy: A Review of the Literature

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JUNE 2015

SALOMONS

CANTERBURY CHRIST CHURCH UNIVERSITY

Abstract

Whilst the physiological barriers to physical activity (PA) are well documented, there has been less focus on psychosocial barriers. In most cases, exercise for mother and foetus is safe; however, PA often significantly decreases during pregnancy which can lead to increased maternal health complications. The reasons behind this are complex. This literature review aimed to systematically search and critique the existing literature on psychosocial barriers to PA. Six electronic databases were used to conduct searches. Quality assessments of the literature were completed according to specific guidance for case series, qualitative, cross-sectional, and longitudinal research. Only papers published in peer-reviewed journals were included. Thirty five papers were included in the review, which methodologically critiqued the literature investigating women's perceptions of the psychosocial barriers to PA during pregnancy. Methodological limitations were discussed and recommendations for clinical practice made, including greater provision of informational support regarding PA for women and their partners, and interventions to increase social support. Further avenues for research such as understanding the meaning of PA and exploring barriers in unique populations were considered.

Key words: Pregnancy, physical activity, barriers, psychosocial

Introduction

Physical Activity during Pregnancy

There were approximately 776,351 live births in the UK last year (Office for National Statistics, 2015), with physical activity (PA) increasingly seen as important for maternal and foetal wellbeing (National Institute for Health and Care Excellence [NICE], 2010).

Perceptions of PA during pregnancy have historically varied. In Western societies during the 19th century, PA in was declared a 'menace to motherhood' and linked to infertility (Verbrugge, 2012), with pregnant women's PA restricted due to concerns about the body's 'delicate' state (Hanson, 2004). Women's reproductive rights increased during the 20th century, conferring more decision-making power to women about their bodies (Hanson, 2004). This extended to PA, with health and physical expression seen as central to women's emancipation and empowerment (Vertinsky, 1998). By the 1960s PA was seen to be compatible with pregnancy, even aiding childbirth (Verbrugge, 2012).

Exercise for mother and foetus during pregnancy is safe in most cases, and women today are advised to initiate or continue exercise during pregnancy (Royal College of Obstetricians and Gynaecologists [RCOG], 2006). The American Congress of Obstetricians and Gynaecologists (ACOG; 2002) recommends that pregnant women without medical or obstetric complications undertake 30 minutes or more of moderate exercise per day on most days of the week. Those who exercised regularly prior to pregnancy should be able to take part in high intensity exercise (e.g. jogging and aerobics) with no adverse effect to mother or foetus, and previously sedentary women are encouraged to start with 15 minutes of exercise three times

per week, gradually increasing to 30 minutes up to four times per week (RCOG, 2006).

The benefits of exercising during pregnancy are widely acknowledged. PA can increase energy, improve sleep, and control excessive weight gain (Ezmerli, 2000). Evidence suggests that weight-bearing exercise throughout pregnancy can reduce the length of labour and decrease delivery complications (Clapp, 1990). PA can also improve women's body image (Marquez-Sterling, Perry, Kaplan, Halberstein, & Signorile, 2000) and increase self-esteem (Wallace, Boyer, Dan, & Holm, 1986). Despite this advice and research, PA behaviour often significantly decreases during pregnancy (Brown & Trost, 2003; Mottola & Campbell, 2003).

Participation in PA during pregnancy is highest in developed countries (Schoenfeld & Tiryaki-Sönmez, 2011); however, only 42% of pregnant women in the UK and 25% in the United States exercise regularly (Evenson & Wen, 2010; RCOG, 2006). Antenatal inactivity can increase the risk of developing hypertension, pre-eclampsia, and gestational diabetes, and is a contributing factor to childhood obesity later in life (Wolfe & Weissgerber, 2003). Inactive pregnant women also experience higher levels of anxiety, depression (including post-partum), and somatic symptoms than their active counterparts, which can interfere with social and daily activities (Claesson, Klein, Sydsjö, & Josefsson, 2014; Goodwin, Astbury, & McMeeken, 2000). Anxiety and depression affect approximately 10 to 15% of all pregnant women (Royal College of Psychiatrists, 2012), with the risk of depression particularly high in the second and third trimesters – a time when PA becomes more difficult due to the physical constraints of a changing body (Bennett, Einarson, Taddio, Koren, & Einarson, 2004). Women who have undergone fertility treatment have a particularly high prevalence of antenatal anxiety - estimated at 34% (Hashemieh, Neisani-

Samani, & Taghinejad, 2011). Regular antenatal PA can enhance psychological wellbeing by decreasing rates of anxiety and depression (Da Costa, Rippen, Dritsa, & Ring, 2003), thus PA helps manage both the physical and psychological aspects of pregnancy.

Due to the clear link between PA and pregnant women's emotional wellbeing, it is important for clinical psychologists to gain an increased understanding of the factors which could inhibit or facilitate PA during pregnancy. The reasons behind antenatal inactivity can be complex and a number of reviews have attempted to collate existing research with the aim of furthering our understanding of this phenomenon.

Previous Reviews

Previous literature reviews (e.g. Hegaard, Pedersen, Nielsen, & Damm, 2007; Poudevigne & O'Connor, 2006) have focused on research concerning the prevalence rates of PA during pregnancy and the effects it can have on psychological variables (e.g. mood and self-esteem) and maternal and foetal health, rather than exploring why it declines.

However, in a literature review which extended Poudevigne and O'Connor's (2006) work, Gaston and Cramp (2011) reviewed the existing research up to 2009 with a more specific focus on correlates and predictors of PA during pregnancy. This review of 25 studies clearly specified its method, inclusion and exclusion criteria, and highlighted some important areas for future research. However, the authors highlight that much of the research focussed on sociodemographic determinants of PA (e.g. economic status, ethnicity) which, whilst informative, are largely unmodifiable. They called for more research focussing on social-cognitive factors associated with PA

engagement which are more amenable to modification through psychological intervention and may inform behaviour change interventions directed at pregnant women (Gaston, Cramp, & Prapavessis, 2012). The authors specifically highlighted the lack of research into women's perceptions of the barriers to PA during pregnancy.

Downs, Chasan-Taber, Evenson, Leiferman, and Yeo (2012) conducted a large scale review of research into pregnancy and exercise which included recent empirical and theoretical research concerning barriers to PA. Intrapersonal (e.g. physical discomfort, uncertainty about exercising safely during pregnancy, lack of information), interpersonal (e.g. the way in which support systems and/or social role models influence PA), and environmental barriers were discussed. The authors recommended that advancements in accurately recording PA during pregnancy were needed as the self-report measures used by many of the studies had some evidence of reliability and validity but could be impacted by recall bias, literacy issues, and cultural adaptation. As much of the research had taken place in developed countries, the review also highlighted the need to examine PA amongst pregnant women in developing countries. It provided some useful recommendations for improving future research; however, it had a broad scope and gave no information about the search method, making it unclear what (if any) inclusion/exclusion criteria were used, or which databases were searched.

Given the lack of clarity surrounding the methodology of the Downs et al. (2012) review, and Gaston and Cramp's (2011) emphasis on the importance of social cognitive factors involved in PA participation during pregnancy, there appeared to be a need for an up to date methodological literature review, involving a systematic search of the literature focused on these factors.

This Review

Rationale and aims. Downs et al. (2012) emphasised the need for further research to consider the multifaceted determinants of PA during pregnancy, and Gaston and Cramp (2011) stressed the lack of research concerning women's perceptions of the barriers to PA during pregnancy. This literature review aims to provide an overview and methodological critique of the existing research on women's perceptions of the psychosocial barriers to PA during pregnancy and to identify gaps for further research.

Since 2012 there have been a number of studies examining women's perceptions of the barriers to PA (particularly qualitative research which may contribute to the 'multifaceted' dimension missing in previous research). This review will include research both prior to and post 2012 as there was no search method included in the Downs et al. (2012) review, thus it is unclear how relevant research was selected. Research that was included in their review may therefore also be included in this review.

Definitions. The existing literature refers to both 'exercise' and 'PA'. Exercise is a type of PA characterised by planning, structure, and improving physical fitness, whereas PA includes exercise in addition to other tasks involving bodily movement such as household chores and recreational activities (World Health Organisation [WHO], 2010). This review will refer to 'PA' as this term encompasses, but is not solely limited to, exercise.

A number of studies (Evenson, Moos, Carrier, & Siega-Riz, 2009; Santos et al., 2014) have defined and discussed barriers to PA during pregnancy according to intra- (occurring within the mind or self) and inter- (relating to relationships or

communication between people) relational factors, thus encompassing a psychosocial perspective. Barriers were defined as anything that may stop a person from doing PA (Cramp & Bray, 2009). As this review is concerned with the psychosocial barriers to PA, research concerning intrapersonal barriers relating to the physical self (e.g. physical discomfort, tiredness) will not be included. By using a definition of interpersonal barriers which is limited to relationships or communication between people, barriers concerning sociodemographic variables (e.g. marital status) are excluded from this review. Included studies will be grouped into 'psychological' and 'social' themes (loosely based on intra- and inter-personal barriers identified in the previous studies referenced) according to their primary findings; however, this review acknowledges that there may be overlap between intra- and inter-personal barriers as the term 'psychosocial' refers to the dynamic inter-relationship between psychological and social factors (Williamson & Robinson, 2006).

Methodology

Relevant papers were identified by systematically searching six electronic databases (PsycINFO, Social Policy and Practice, Maternity and Infant Care, Cochrane Systematic Reviews, Applied Social Sciences Index and Abstracts, Web of Science) according to PRISMA guidance (Moher, Liberati, Tetzlaff, & Altman, 2009). Reference lists of pertinent papers were also searched. After examining the abstracts, papers that appeared relevant to this literature review were obtained and assessed in relation to the selection criteria. A thorough explanation of each stage of the search process is provided (Appendix A). The following search strings were used in each database to maximise the opportunity to identify relevant papers:

- 1) (psychosocial OR social OR psychological OR wellbeing OR quality of life OR mental health OR emotional state OR mood) AND (physical activity OR exercise) AND pregnan*
- 2) (barriers OR obstacles OR challenges) AND (physical activity OR exercise) AND pregnan*

Studies meeting the following criteria were included:

- Presents original research findings
- Peer reviewed
- Written in English
- Focussed on women's experiences or views about PA and perceived barriers during pregnancy

Papers were excluded if their main focus was on the following:

- Post-partum PA behaviour (retrospective studies sampling post-partum women but which focussed on their experiences during pregnancy were included)
- Physical barriers
- Validation of a measure
- Specific health populations with complex needs e.g. pregnant smokers, women with a history of, or current, gestational diabetes mellitus (GDM), and those of morbid obesity
- The prevalence of PA throughout pregnancy (rather than the reasons behind this)

- Sociodemographic variables (e.g. marital status, ethnicity) associated with increased or decreased PA

The final selection of papers was critiqued according to guidance from Yin (2003) for the one study using a case series, Yardley (2000) for qualitative research, and Vandenbroucke et al. (2007) for cross-sectional and longitudinal research (Appendices B-D).

Literature Review

This review will explore and critique the findings of existing literature concerning the psychosocial barriers to PA during pregnancy. A summary table of the 35 papers included in this review can be found in Table 1. The review will conclude by discussing the clinical implications of the existing research and identifying gaps in the literature to consider for future research.

Psychological Barriers

Intention. Existing literature has historically lacked a theoretical framework of understanding into the psychosocial and cognitive determinants of PA behaviour, particularly intention (Symons Downs & Hausenblas, 2003).

Godin et al.'s (1994) cross-sectional study, which examined the relationship between perceived barriers and intention to participate in PA, was one of the first to consider the Theory of Planned Behaviour (TPB; Ajzen, 1991) as a social-cognitive framework to examine women's intention and subsequent likelihood to engage in PA. The TPB is based on the premise that a person's *intention* to execute a behaviour (e.g. to be physically active) is the main variable that determines whether

the person subsequently executes that behaviour (Hausenblas & Symons Downs, 2004). It argues a person's beliefs influence firstly their attitude towards a behaviour (the positive or negative evaluation of PA), secondly the subjective norm (the perceived social pressure to be physically active or not), and thirdly their perceived behavioural control (PBC; the perceived ease or difficulty of PA), which together determine intention.

Godin et al.'s (1994) study was one of the few in this review that explicitly used a pilot group of pregnant women to develop a measure focussing on perceived barriers to PA, although the final questionnaire had a limited list of barriers to choose from, with no option to provide a qualitative response. Internal consistency of the questionnaire was acceptable (7 items; $\alpha=.68$). Participants were asked to provide a rating for the probability that each barrier would prevent them from exercising regularly. The study found a negative correlation between probability of interference from perceived barriers to PA and intention.

Further research extended Godin et al.'s (1994) work. In their cross-sectional study, Symons Downs and Hausenblas (2004) aimed to elicit the beliefs of post-partum women about PA during their pregnancy and following birth to determine those that were most salient to intention. Seventy four women within one year of giving birth were recruited via purposive sampling.

Beliefs were measured using the Exercise Beliefs Questionnaire (EBQ) and PA behaviour by using the Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985). The EBQ was developed specifically for the study and whilst content validity was established, the questionnaire's reliability was debatable as it was the first time it had been used. The LTEQ has previously been shown to be a valid and reliable measure of PA behaviour, although not with pregnant women.

Table 1. *Articles reviewed.*

Authors/ Year	Sample and location	Measures	Study Design	Key Findings
Intention				
Godin et al. (1994)	Three independent samples; general population (n=349), coronary heart disease (n=162) and pregnant women of 4-5 months gestation (n=152) Canada	Perceived Barriers Measure (investigator developed; 6 point Likert scale)	Cross-sectional	Perceived barriers to PA were negatively related to intention in all three samples.
Symons Downs and Hausenblas (2003)	89 pregnant women United States of America (USA)	Personal history questionnaire Self-report measures of PA attitude, subjective norm, perceived behavioural control, intention, and PA behaviour (based on Ajzen, 1991)	Longitudinal; repeated measures (second and third trimester)	Intention significantly predicted PA behaviour. Attitude was the strongest determinant of intention to engage in PA, followed by perceived behavioural control, and subjective norm.
Symons Downs and Hausenblas (2004)	74 postpartum women (up to one year post-birth) USA	Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985) Exercise Beliefs Questionnaire (investigator developed)	Retrospective cross-sectional	Women believed that PA improved mood, increased energy and fitness, and controlled weight during pregnancy. Partners were the most the most common normative influence (pregnancy and post-partum), followed by children and other family members.
Hausenblas and Symons Downs (2004)	104 pregnant women USA	Self-report measures of intention, attitude, perceived behavioural control, and subjective norm LTEQ	Longitudinal; repeated measures (beginning and end of first trimester)	Perceived behavioural control significantly predicted PA behaviour. Subjective norm and attitude were significant predictors of PA intention.
Hausenblas, Downs, Giacobbi, Tuccitto, and Cook (2008)	61 pregnant women USA	Self-report measures of PA attitude, subjective norm, perceived behavioural control, intention, and PA behaviour LTEQ	Longitudinal; repeated measures (first and second trimester)	Perceived behavioural control and attitude were independently associated with PA intention. Subjective norm did not significantly predict intention. Perceived behavioural control did not significantly predict PA behaviour.
Hausenblas, Giacobbi, Cook, Rhodes, and Cruz (2011)	38 pregnant and 43 non-pregnant women USA	Self-report measures of PA attitude, subjective norm, perceived behavioural control, intention, and PA behaviour Pregnancy Physical Activity Questionnaire (Chasan-Taber et al., 2004)	Longitudinal; repeated measures (all trimesters)	Pregnant women reported 'pregnancy-specific' beliefs that varied according to trimester, whereas non-pregnant women's beliefs were consistent across time.

Motivation				
Marshall, Bland, and Melton (2013)	88 pregnant women (second and third trimester) from a rural community USA	International Physical Activity Questionnaire (IPAQ; Craig et al., 2003) One open-ended item seeking a description of personal barriers to engagement in regular PA	Cross-sectional	Seven major barrier themes emerged including: 'symptoms in pregnancy', 'family and childrearing responsibilities and activities', 'lack of personal motivation', 'time and employment demands', 'daily life activities provide sufficient exercise', 'fear of harm or injury', and 'no history or habit of activity or exercise'.
Gaston, Wilson, Mack, Elliot, and Prapavessis (2013)	75 pregnant women (all trimesters) USA	LTEQ (Godin & Shephard, 1985) Behavioural Regulation in Exercise Questionnaire (Mullan, Markland, & Ingledew, 1997) Barriers to exercise measure (based on Symons Downs & Hausenblas, 2004)	Cross-sectional	Identified regulation (a type of intrinsic motivation) predicted greater exercise behaviour and fewer exercise barriers, irrespective of trimester, whereas external regulation was positively associated with greater perceived barriers.
Groth and Morrison-Beedy (2013)	26 pregnant African-American women (all trimesters) USA	Qualitative insight through the use of focus groups into what women thought about PA during pregnancy, and what and where they ate	Qualitative Three focus group interviews analysed using content analysis	Two themes related to PA during pregnancy identified as 'fatigue and low energy dictating activity', and 'motivation to exercise is not there'. Three themes related to diet identified as 'appetite, cravings and taste drive eating behaviour', 'I'll decide for myself what to eat', and 'eating out is a way of life'.
Self-efficacy				
Hinton and Olson (2001)	622 pregnant rural white women USA	Prenatal questionnaire measuring attitudes towards weight gain during pregnancy, feelings about motherhood, career role orientation, self-efficacy, body image, and social support	Longitudinal; repeated measures (all trimesters and one year post-partum)	Change in PA after becoming pregnant was associated with pre-pregnancy PA frequency, with frequent exercisers moderating their activity after becoming pregnant. Exercise self-efficacy and BMI were positively related to PA behaviour during pregnancy.
Cramp and Bray (2009)	160 pregnant women (second and third trimesters) USA	Exercise barriers and barrier self-efficacy questionnaire Modifiable Activity Questionnaire (MAQ; Kriska et al., 1990)	Longitudinal; repeated and between measures	A total of 1168 barriers yielded 9 major themes including fatigue, time constraints and physical limitations. Barrier self-efficacy and exercise self-efficacy both independently predicted leisure time

				physical activity (LTPA) behaviour.
Melton, Marshall, Bland, Schmidt, and Guion (2013)	88 pregnant rural women USA	IPAQ Exercise Self Efficacy Scale Questionnaire measuring perceived benefits of exercise and awareness of safety precautions (investigator developed)	Cross-sectional	Women showed inadequate and inaccurate knowledge of the risks and benefits of PA during pregnancy
Risk Awareness and Misperceptions				
Duncombe, Wertheim, Skouteris, Paxton and Kelly (2009)	158 pregnant women Australia	Exercise Safety Beliefs Questionnaire One week exercise diary	Longitudinal; repeated measures at three time points (during second and third trimesters)	Amount and intensity of PA decreased over the course of the pregnancy. Some women also reported safety concerns, which predicted the amount and/or intensity of PA.
Evenson and Bradley (2010)	1306 pregnant women (second or third trimester) USA	Telephone interview Self-administered questionnaire measuring exercise regime pre- and post-pregnancy and beliefs about exercise	Cross-sectional	Most women agreed with the benefits of light activity, fewer agreed that there were benefits to moderate or vigorous exercise.
Mudd, Nechuta, Pivarnik, Paneth and the Michigan Alliance for the National Children's Study (2009)	296 pregnant women (across all trimesters) USA	Face-to-face interview	Cross-sectional	Most women felt that moderate PA was safe, but were unsure about the safety of vigorous PA
Cioffi et al. (2010)	19 pregnant women (various stages of pregnancy) Australia	Face-to-face interviews focussed on women's experiences of PA during pregnancy	Qualitative 16 women took part in individual interviews, three took part in a group interview. Descriptive analysis was used	Analysis yielded four categories: 'meaning of physical activity', 'physical benefits of physical activity during pregnancy', 'barriers to and motivations for being physically active', some of which were trimester specific, and 'the process of engagement' with responses influenced by awareness of risk and the notion of protection.
Hegaard, Kjaergaard, Damm, Petersson, and Dykes. (2010)	19 postpartum women who were physically active before pregnancy Sweden	Retrospective accounts of women's PA experiences during pregnancy	Qualitative Semi-structured interview using content analysis	Four categories of experiences of PA during pregnancy (including barriers and how to overcome them) were developed: 'physical activity as a lifestyle', 'body awareness', 'carefulness' and 'sense of benefit'.

Goodrich, Cregger, Wilcox, and Liu (2013)	33 overweight or obese African-American women (all trimesters and early postpartum) USA	Semi-structured interviews examining perceptions of barriers, risks, motivators, and enablers of exercise and healthy eating	Qualitative Data analysis based on socioecological model	The majority of participants were motivated to exercise for personal health benefits, but cited many barriers to exercise. One of the most common risk perceptions was of falling.
Hanghøj (2013)	Five pregnant Danish women (third trimester) Denmark	Semi-structured interviews exploring healthy women's perceptions of risk associated with PA during pregnancy	Qualitative Case series using narrative analysis to cover the story and paradigmatic analysis to cover the themes	Most stories highlighted specific experiences (e.g. previous miscarriage, fertility treatment) which triggered anxiety. Bodily changes and pain also scared participants. Stories described the impact of women's relatives and friends on their perception of risk.
Informational				
Weallens, Clark, MacIntyre, and Gaudoin (2003)	42 first-time mothers who had given birth within the last three days UK	Face-to-face survey of exercise patterns (investigator-developed but included some questions from a previously validated questionnaire)	Cross-sectional	Exercise declined significantly during the first trimester. Participants' knowledge of the benefits of PA was limited. A significant minority of women received no advice from any source on exercise during pregnancy.
Clarke and Gross (2004)	57 nulliparous, pregnant women (second and third trimesters) UK	Semi-structured interviews at 16, 25, 34 and 38 week's gestation Modified Baecke questionnaire (Pols et al., 1995) Foetal Health Locus of Control Scale (Labs & Wurtele, 1986)	Mixed methods; qualitative (semi-structured interviews) and quantitative (longitudinal, repeated measures)	96% had received advice about PA at least once during pregnancy; however, only 18% reported receiving advice directly from a healthcare professional involved in their care. 22% were given confusing or contradictory recommendations. In the third trimester, most information regarding PA came from friends and family.
Weir et al. (2010)	14 overweight or obese women (in 'late pregnancy') UK	Semi-structured interviews to explore the views and experiences of overweight or obese women during pregnancy in order to inform interventions to increase PA	Qualitative; data analysis was informed by Theory of Planned Behaviour and used a Framework Approach	Healthy eating was generally viewed as more important for mother and baby's health than PA. Numerous barriers to PA during pregnancy were found including lack of information and support regarding PA from health professionals and health problems.

Stengel, Kraschnewski, Hwang, Kjerulff, and Chuang (2012)	24 post-partum women (12 overweight and 12 obese) USA	Semi-structured interviews to elicit women's experiences of gestational weight gain	Qualitative; grounded theory approach	Three themes found regarding provider advice on PA during pregnancy: 'women received limited or no advice on appropriate PA during pregnancy, 'women were advised to be cautious and limit PA during pregnancy', and 'women perceived that provider knowledge on appropriate exercise intensity and frequency in pregnancy was limited'.
Leppanen et al. (2014)	399 pregnant women at increased risk of gestational diabetes mellitus recruited at 8-12 weeks gestation Finland	Self-report measure of leisure time PA (Aittasalo, Pasanen, Fogelholm, & Ojala, 2010)	Longitudinal; repeated measures at baseline, 26-28 weeks, and 36-37 weeks gestation	More than one quarter of participants reported than no one, including health professionals, encouraged them to engage in LTPA. Tiredness, nausea, work, perceived health, and lack of time were the biggest barriers to LTPA. Predictors included pre-pregnancy LTPA, education, working part-time and a spouse's LTPA.
Social and Emotional Support				
Evenson, Moos, Carrier, and Siega-Riz (2009)	Two separate samples: 1558 pregnant women (27-30 weeks gestation) for quantitative part of research, a further 58 pregnant women (20-37 weeks gestation) for qualitative part USA	Telephone survey regarding women's perceptions of the main barrier to PA Focus groups focussing on women's perspectives of PA, healthy eating, and weight gain	Mixed methods; qualitative (thirteen focus groups stratified according to ethnicity and BMI) and quantitative (longitudinal, repeated measures)	85% of survey participants reported an interpersonal barrier to PA, the majority of which were health related. Only 2% reported interpersonal barriers to PA. Focus group data contrasted this, where intrapersonal barriers were the most frequently cited and discussed.
Leiferman, Swibas, Koiness, Marshall, and Dunn (2011)	25 pregnant women (second or third trimester) USA	Individual and paired interviews with pilot-studied, open ended questions	Qualitative; data analysed according to a socioecological framework	Perceived barriers and motivating factors for PA differed between exercisers and non-exercisers at various levels including the intrapersonal, interpersonal and environmental.
Da Costa and Ireland (2013)	82 pregnant women (first trimester) Canada	Extensive battery of questionnaires including the Exercise Benefits/Barriers Scale, Self-Efficacy for Exercise Scale, Social Support for Exercise Scale, Edinburgh Postnatal Depression Scale, General Fatigue	Cross-sectional	Women who were inactive prior to pregnancy reported fewer perceived benefits and greater perceived barriers to LTPA during pregnancy. For these women, lower family support and lower self-efficacy for PA were

		Subscale, and Paffenbarger Physical Activity Questionnaire		significantly related to higher PA barrier scores.
Fieril, Olsén Glantz, and Larsson (2014)	17 pregnant women who exercised on a regular basis (second and third trimesters) Sweden	Semi-structured, face-to-face interviews used to capture women's experiences of PA during pregnancy	Qualitative; inductive content analysis used	Four categories identified: 'positive impact on body and mind', 'expected benefits and facilitators', 'new exercise barriers' and 'overcoming exercise barriers'. Psychosocial aspects such as 'sense of exclusion' and 'lack of others' understanding' were cited.
Santos et al. (2014)	78 pregnant women Portugal	Seven day accelerometer data Barriers to PA questionnaire (based on Evenson et al., 2009)	Longitudinal; repeated measures at 10-12 weeks and 20-22 weeks gestation	Most women did not reach recommended levels of PA. No significant differences were found regarding barriers to LTPA between T1 and T2. Interpersonal barriers were least commonly cited by participants.
Cultural Norms				
Kieffer, Willis, Arellano, and Guzman (2002)	22 pregnant Latina women (third trimester to 12 weeks postpartum) USA	Focus groups focussing on beliefs about diabetes and factors influencing regular PA participation	Qualitative; longitudinal repeated measures study using a focus group at three time points (third trimester, 6 weeks postpartum, 12 weeks postpartum)	Social isolation was perceived as a major barrier to PA and encompassed family concerns about safety and appropriate maternal behaviour. Women suggested an organised PA group intervention.
Thornton et al. (2006)	Dyads of 10 pregnant or postpartum Latina women and 10 people who they perceived influenced them (e.g. husband) USA	Semi-structured interviews investigating the influence of social support on PA-related beliefs and behaviours, diet, and weight	Qualitative; grounded theory approach	Husbands were the primary source of emotional, instrumental and informational support regarding diet, weight and PA related beliefs and behaviours. Absence of mothers, other female relatives, and friends were also major barriers to continuing healthy practices during pregnancy.
Doran and O'Brien. (2007)	17 women from different cultural groups (Indigenous to New South Wales, Western Samoan, and Anglo-Saxon) Australia	Four focus groups of two to five members to explore women's opinions about PA during pregnancy	Qualitative; focus groups were analysed using thematic analysis	No specific cultural influences were identified by Indigenous women. Samoan women agreed pregnancy was considered a time of rest. Exercising in moderation was a common theme. Barriers included nausea, getting bigger, tiredness, and

				uncertainty/lack of knowledge about what women could do when pregnant.
Marquez et al. (2009)	13 pregnant Latina and 7 pregnant non-Latina white women USA	Three focus groups (two of Latina women, one of non-Latina women) focussing on pregnant Latina women's perceptions and understandings of PA	Qualitative; content analysis was used	Physical limitations, lack of resources, energy, and lack of time were barriers common to all three focus groups. Lack of information about PA was cited as a major barrier only by Latina women.
Krans and Chang (2011)	34 pregnant African-American women (across all trimesters) USA	Six focus groups (3-8 participants in each) eliciting perceived barriers and facilitators to PA during pregnancy	Qualitative; focus groups analysed using a grounded theory approach	All participants perceived PA as beneficial during pregnancy. Barriers included individual, informational, resource-based, and socio-cultural. African-American culture was seen to affect PA motivation.
Social Modelling				
Haakstad, Voldner, Henriksen, and Bo (2009)	467 healthy pregnant women (third trimester) Norway	Investigator developed questionnaire focussing on current level of PA, social modelling, common pregnancy complaints, and attitudes towards and barriers to PA participation	Cross-sectional	Less than 11% were classed as regular exercisers in the third trimester. High gestational weight gain and lack of social role models with respect to PA behaviour during childhood were inversely associated with PA in the third trimester. Not receiving advice about PA from health professionals was a borderline significant factor.

As this study focussed only on eliciting positive evaluations (i.e. advantages) of exercise, women's beliefs about the disadvantages of PA were not known. Later research focussed on both positive and negative evaluations of PA and found the most salient 'disadvantage' beliefs were trimester specific, with limited knowledge about the safety of PA and fear of harming the baby amongst the most salient beliefs in the first trimester, and fear of preterm labour the most salient in the second and third trimesters (Hausenblas, Giacobbi, Cook, Rhodes, & Cruz, 2011).

Symons Downs and Hausenblas (2004) found that beliefs related to perceived social pressure during pregnancy were most influenced by women's partners, children, and other family members, emphasising the influence of families on women's beliefs and therefore their intention to participate in PA. Lack of motivation was cited as an obstructing factor over the course of pregnancy; however, this was considered a less salient barrier (cited by 8.1% of the sample) compared to physical limitations (56.8%). Later research showed that whilst physical limitations were still cited as a significant barrier to PA (47%), other factors including fear of miscarriage (9%) and lack of knowledge about the safety of antenatal PA (9%) were also important during the first trimester (Hausenblas et al., 2011).

Symons Downs and Hausenblas' (2004) research was complimented by other studies which examined the TPB's utility for understanding and explaining PA behaviour during the first trimester of pregnancy (Hausenblas & Symons Downs, 2004), first and second trimester (Hausenblas, Downs, Giacobbi, Tuccitto, & Cook, 2008), second and third trimester (Symons Downs & Hausenblas, 2003), and all three trimesters (Hausenblas et al., 2011). Exploring the differences between trimesters is important as pregnancy is a time of significant bio-psycho-social change. With one exception (Symons Downs & Hausenblas, 2003), these studies gave scarce information on their sampling method, nor how the study sizes (ranging between 61 and 104) were arrived at, including missing data. Most used the LTEQ to assess PA although Hausenblas et al. (2011) used the Pregnancy PA Questionnaire (Chasan-Taber et al., 2004) which has been shown to be a reliable and accurate measure of PA in pregnant women. Objective measures of PA behaviour were missing in all the studies, thus responses may have been prone to social desirability bias.

These studies suggest attitude is a strong determinant of intention to engage in PA (Hausenblas & Symons Downs, 2004; Symons Downs & Hausenblas, 2003) whereas subjective norm is often the weakest (Hausenblas, et al., 2008; Symons Downs & Hausenblas, 2003). However, behaviour in individualistic cultures (such as North America, where the studies were based) is guided more by personal attitude than social norms because people perceive themselves as independent to the group. In contrast, collectivist cultures value interdependence and behaviour is guided more by the expectations of others (Van Hooft & De Jong, 2009). Determinants of intention are therefore likely to be influenced by cultural practices; however, this is not recognised by any of the studies.

Motivation. Whilst the TPB indirectly addresses motivation for PA in pregnancy by examining intention, Gaston, Wilson, Mack, Elliot, and Prapavessis (2013) explored motivation in greater depth by using organismic integration theory, a component of self-determination theory (Deci & Ryan, 2002). Findings suggested external regulation of motivation (e.g. a desire to please others) was positively associated with greater perceived barriers to PA, whereas more intrinsic forms of motivation (e.g. personally valuing PA) were associated with fewer barriers. These findings might be reflective of an individualistic culture rather than a collectivist one given the emphasis on personal value of PA. The study's cross-sectional design also limits the conclusions that can be drawn regarding causality between the motives and barriers to PA.

Groth and Morrison-Beedy (2013)'s qualitative study used focus groups to explore how low income pregnant African-American women (n=26) viewed PA during pregnancy. They found that whilst most women in the study agreed it was beneficial

to be active, many lacked the intrinsic motivation to take part - if they did not feel like being active, they did not push themselves to do so. This appears to support Gaston et al.'s (2013) findings regarding the importance of intrinsic motivation for engagement in PA; however, the investigators relied on descriptive accounts of PA rather than specifically enquiring about activity levels, thus it cannot be assumed that a lack of intrinsic motivation led to decreased PA as this was not specifically measured.

Marshall, Bland, and Melton (2013) provided further evidence of lack of personal motivation as a barrier to PA in their cross-sectional study. However, as the investigators noted, this conclusion was drawn from one open-ended question ('what is stopping you?') which was not followed up. Furthermore, only one third of the 88 participants responded to the question, raising questions about response bias. Further research investigating the meaning of PA for women during pregnancy may extend our understanding of its value and women's motivation for taking part.

Notably, the predictive value of motivation and intention to engage in PA is trimester dependent and thus subject to change. Hausenblas and Symons Downs (2004) found that pregnant women's appraisal of the ease or difficulty of engaging in exercise (i.e. PBC), rather than motivation or intention, was the most salient determinant of PA behaviour in the first trimester. In a study such as Groth and Morrison-Beedy (2013), where the majority of participants were in their first and second trimesters, the findings may not therefore be representative of women throughout pregnancy.

Self-efficacy. Whilst theories surrounding TPB can be useful in explaining intention to engage in PA, other psychosocial factors, such as self-efficacy, also

affect PA behaviour. Self-efficacy refers to a person's confidence in his or her ability to perform a specific action required to achieve a specific outcome (Bandura, 1986); for example, overcoming perceived barriers to PA.

Cramp and Bray's (2009) longitudinal study of 160 women assessed perceived barriers at four different time points throughout pregnancy and examined self-efficacy as a predictor of PA. It gave a clear description of participant sampling and participation throughout, as well as its design and procedure. The Modifiable Activity Questionnaire (MAQ; Kriska et al., 1990), a standardised measure, was used to measure PA. Investigator developed questionnaires were used to determine perceived barriers to PA, and measure barrier and PA self-efficacy. The questionnaire exploring PA barriers consisted of both open and closed questions in contrast to other studies (e.g. Duncombe, Wertheim, Skouteris, Paxton, & Kelly, 2009) which potentially excluded salient barriers by solely using investigator determined ones. Regression analysis showed barrier and PA self-efficacy predicated PA at three separate time points ($p < .05$) and accounted for up to 37% of the variance. Further analysis suggested that self-efficacy judgements concerning the ability to perform PA on a regular basis might be informed by self-efficacy to overcome barriers to PA. Thus, self-efficacy to overcome perceived barriers is an important factor in a woman's ability to engage in PA. This study used a self-selecting population which was predominantly white and middle class, so generalisability of results is limited. The investigators also noted that only leisure time PA was investigated so results may not apply to overall levels of PA, which can include occupational or household activities.

Further support for the importance of PA self-efficacy in predicting PA behaviour comes from earlier research by Hinton and Olson (2001) who found higher

PA self-efficacy was associated with increased PA. This large scale (n=622) longitudinal study concluded that interventions that help women to engage in PA should focus on increasing self-efficacy, and gave a number of useful suggestions for clinical practice.

In contrast, a cross-sectional study of 88 rural pregnant women by Melton, Marshall, Bland, Schmidt, and Guion (2013) found no significant differences between self-reported levels of exercise (low, moderate, or high) and exercise self-efficacy as measured by an adapted version of the Exercise Self-Efficacy Scale (ESES; Kroll, Kehn, Ho, & Groah, 2007), a questionnaire with established validity and reliability. This seems to contradict Hinton and Olson's (2001) findings that higher exercise self-efficacy predicts PA behaviour. Despite this, the study used descriptive data to show that 43.2% of the women believed that they could not exercise without consulting a physician, and only 31.8% reported confidence to exercise when tired, suggesting self-efficacy may still be a relevant construct to consider in the context of PA. This study did not consider any limitations of the research and used a convenience sample, again limiting generalisability.

Risk awareness and misperceptions. The notion of risk and misperceptions about the safety of PA were barriers that often appeared in the literature. In the context of the TPB, these negative beliefs influence a person's attitude and may decrease intention to engage in PA. Duncombe et al. (2009) explored pregnant women's explanations for engaging in or avoiding PA, and their beliefs about the safety of antenatal PA. The longitudinal study design allowed data to be collected at three time points during pregnancy, enabling comparisons and changes over time to be considered. An exercise safety beliefs questionnaire was

developed by the investigators, with participants asked to rate the perceived safety of low, moderate, and vigorous intensity PA on a five-point Likert scale. Further investigator developed questions measuring perceived facilitators and barriers to PA were included; however, this non-validated, non-reliability tested measure was comprised mainly of closed questions and used only investigator determined barriers, potentially excluding other salient barriers. A self-report activity diary was also included.

Most participants believed that low intensity PA was very safe during pregnancy; however, 27% cited concerns about the safety of five or more moderate PA sessions per week, and most women (57%) believed that weight bearing PA such as jogging was unsafe. Beliefs that low to moderate PA was unsafe predicted a decrease in the amount of time spent engaging in PA across pregnancy (T1 $r=.18$, T3 $r=.20$, $p<.05$). However, as the investigators note, these significant correlations are low, suggesting that other factors such as tiredness and physical discomfort may have played a large role in determining PA patterns. Whilst 158 participants were recruited from the general population, the majority came from a university educated background, thus replication in a more diverse sample could be useful.

Supporting these findings, Evenson and Bradley's (2010) large scale study ($n=1306$) of women in the first two trimesters of pregnancy found that 22% disagreed that most women could continue regular exercise during pregnancy, and a large number did not believe that there were benefits to participating in moderate (27%) or vigorous (87%) PA. The study also noted that 68% of women believed that those who did not exercise could not begin to do so during pregnancy, contradicting official guidance (ACOG, 2002). Scant information about the measures was provided and

the study website is no longer in use, severely limiting the available knowledge about the research method, measures, or protocol.

Mudd, Nechuta, Pivarnik, Paneth, and the Michigan Alliance for National Children's Study (2009) explored associations between PA participation, safety precautions, and demographic variables in their cross-sectional study. Similarly to Duncombe et al.'s (2009) study, a five-point Likert scale (ranging from 'very safe' to 'very unsafe') was used to assess women's safety beliefs about moderate and vigorous activity; however, this was a non-validated measure. Findings showed that 10% were unsure whether moderate activity was safe and approximately 2% cited it as unsafe, whereas 49% felt vigorous activity was unsafe. The majority of women (82.1%) were in their first trimester so it is unclear whether changes in beliefs would have been found over time, although previous research would suggest not.

Much of the quantitative research in this area has focussed on correlations between sociodemographic variables and exercise, providing only descriptive data concerning women's beliefs about safety of PA during pregnancy (i.e. whether they felt it was safe or not). Qualitative research has furthered our understanding of the specific beliefs and worries women may face when considering antenatal PA.

Goodrich, Cregger, Wilcox, and Liu (2013) used a socioecological framework to conduct semi-structured interviews with African-American women, a group for whom research into barriers to PA is limited, making the research important. No information was given as to the specific analysis although it appeared content analysis was used. Jogging was seen as an 'unsafe' exercise which was seen to overly strain the body and potentially induce miscarriage. Other perceived risks included falling and premature labour, despite findings that rates of PA related injuries during pregnancy are very low (Vladutiu, Evenson, & Marshall, 2010). The

study benefitted from a relatively large sample size in comparison to other qualitative studies.

Hegaard, Kjaergaard, Damm, Petersson, and Dykes (2010) investigated women's experiences and perceptions of PA during pregnancy using semi-structured interviews with 19 women. Content analysis yielded four categories, including 'carefulness'. Sub-categories included 'feelings of worry' and 'balancing worry and a sense of security' (the latter encompassing further sub-categories of 'security from within' and 'security from without'). Whilst all participants experienced a certain degree of worry, this influenced their level of PA to varying degrees. Pregnant women who had received fertility treatment were most concerned - an important finding as there is little research in this area. Some participants voiced concerns about PA leading to miscarriage, and as with the quantitative research, concern was felt in relation to specific types of exercise that were seen as too strenuous, such as jogging and strength training. This study provides a comprehensive audit trail and important clinical implications for midwives and physicians; however, it may be limited by recall bias as women were interviewed three to four years after the birth of their child.

Cioffi et al. (2010) used a qualitative, descriptive analysis in their research, exploring women's perceptions and influencing factors of PA. Sixteen women participated in individual interviews and three participated in a small group interview. 'Process of engagement in PA' emerged as a category, encompassing a personal awareness of risk and uncertainty. The notion of protectiveness was implicit throughout the women's discussions about PA but changeable in its nature - in the early stages of pregnancy the primary concern was to protect the foetus, whereas later on in pregnancy this became a more even concern between protecting the

foetus and oneself, then finally to protecting oneself. Similarly to Hegaard et al.'s (2010) study, the authors noted that in the early stages of pregnancy it was women who had experienced a previous miscarriage or had difficulty conceiving whose concern was most apparent. As with previously discussed qualitative research, there was no reflection of the balance of power in this study, nor a demonstration of reflexivity.

Hanghøj (2013) was the only case series study in the review, involving five women whose interviews were analysed using narrative and paradigmatic analysis and using a sociological theory of the ontology of the pregnant body (Lupton, 1999) as a framework. The study met most of Yin's (2003) quality criteria and was significant in its use of narrative analysis whilst exploring pregnant women's perceptions of risk (previous studies largely used content analysis). Risk was an underlying issue for all participants. This was explored in theoretical terms and the themes identified (e.g. 'previous pregnancy-related experiences' and 'the role of friends and family') were relevant to a wider audience. Whilst the study had a small sample, the investigator reported that data saturation was met, although the themes and findings could have been discussed in more detail. A reflection of the limitations of the research was provided.

Cultural context was not considered in any of the studies reviewed despite the likelihood that PA risk perceptions are likely to vary. Vertinsky (1998) argued that safety concerns about antenatal PA in Western countries (where the reviewed studies took place) are heavily influenced by Western legislation which equates pregnancy with disability or sickness. This results in antenatal PA being seen as unusual or abnormal (Halpert, Wilson, & Hickman, 1993) which may not be the case in other cultures.

Social Barriers

Informational. A small scale (n=44) face to face survey of Scottish women who had recently delivered their first child was used by Weallens, Clark, MacIntyre, and Gaudoin (2003) to examine PA patterns during pregnancy, showing that PA decreased per trimester. Women were asked about PA information sources during pregnancy, with 40% reporting they received no advice at all from any source. Nearly one fifth of women per trimester had no specific knowledge of the benefits of exercise, and for most it was only in the final stages of pregnancy that PA was seen as beneficial to the baby's health. This study could have benefitted from more information regarding the questionnaire used, which was developed for this study and therefore unvalidated, although the investigators did note that questions from a previously validated questionnaire were incorporated.

Clarke and Gross (2004) carried out semi-structured interviews with 57 women throughout pregnancy (16, 25, 34, and 38 weeks gestation) as part of their longitudinal research study. A modified version of the Baecke questionnaire (Pols et al., 1995) which has established validity and reliability in non-pregnant populations was also used to measure self-reported PA activity, in addition to a 10 item scale assessing maternal beliefs regarding the importance of PA in pregnancy. The foetal health locus of control scale (Labs & Wurtele, 1986) was used to measure the extent to which women believed their own behaviour, the behaviour of others, and/or chance would influence foetal health. Wilcoxon matched pairs tests showed that the perceived importance of having a good night's sleep was rated more highly than exercising regularly ($Z=4.13$, $p<.001$) and maintaining an active lifestyle ($Z=4.44$,

$p < .001$). Only 18% of women reported receiving advice about PA from the healthcare professionals involved in their care and 22% reported being given confusing or contradictory recommendations. Interestingly, 67% of women at 16 weeks gestation relied on reading as their main source of information about PA, whereas by 25 weeks gestation, advice primarily came from friends and family, and family discouragement of PA outweighed family encouragement. By 38 weeks gestation, 95% of women who had received advice were following it, illustrating how crucial PA advice can be in influencing activity. Whilst the study provided a good level of detail concerning its findings and statistical analyses, research limitations were not considered.

Weir et al.'s (2010) qualitative study used purposive sampling to interview 14 overweight and obese women according to a TPB framework. In terms of normative beliefs (i.e. perceived social expectations), most felt they had not received an adequate level of information regarding PA in pregnancy. They cited their midwife as the most appropriate healthcare professional to provide advice; however, no midwives were perceived to have taken on this role. Participants had often received conflicting lay knowledge from friends and family (e.g. some reported that their mothers had discouraged PA during pregnancy whilst their partners encouraged it) which was experienced as confusing, and other sources of information (reading, internet) were experienced as negative, impersonal, and conflicting. This study has important clinical implications given the emphasis participants placed on the role of the midwife in promoting PA. It was also one of the only qualitative studies in the review to explicitly acknowledge the reflexivity of the research.

Another qualitative study which looked at perceptions of provider advice of PA and gestational weight gain in overweight and obese women was undertaken by

Stengel, Kraschnewski, Hwang, Kjerulff, and Chuang (2012). A grounded theory approach yielded three themes regarding PA in pregnancy: 'women received limited or no advice about appropriate PA in pregnancy', 'women were advised to limit exercise and be cautious', and 'women perceived that professional knowledge about appropriate PA intensity and frequency was limited'. Clinical utility was demonstrated through the consideration of practice implications. Twenty four women were interviewed, thus while we cannot assume generalisability of results, the study does appear to support the findings of Evenson et al. (2009), who found that women often received conflicting advice about PA from members of their support network, including health professionals and family members.

Leppanen et al. (2014) carried out a longitudinal study of women with an increased risk of GDM, using an open-ended questionnaire to explore perceived barriers to PA. They found that only 13 out of the 399 participants were encouraged to take part in PA by a health professional, and one quarter reported that no-one, including friends or family, encouraged them to take part. Women who reported that encouragement from or exercising with others were motivating factors to engage in PA were more likely to maintain or increase their PA behaviour throughout pregnancy compared to those who did not. The large scale of this study and its use of an open-ended questionnaire enhanced its quality.

Social and emotional support. Lack of social and emotional support from friends and family was cited as a barrier to PA in a number of studies. Da Costa and Ireland's (2013) cross-sectional research used a number of standardised measures and found that for women who were inactive prior to pregnancy, lower family support ($B=-.40, p<.01$) and lower self-efficacy for PA ($B=-.33, p<.05$) were significantly

related to higher PA barrier scores, accounting for 35% of the variance. This study only sampled women during their first trimester in pregnancy, therefore results are not necessarily generalisable to the later stages of pregnancy. It also used a questionnaire giving the option of 14 pre-determined barriers which may have limited participants' responses; however, the study was thorough in its description of the research process and in reporting the results (e.g. inclusion of effect sizes), thereby promoting confidence in the data.

Qualitative research was able to provide a deeper understanding of the role of emotional and social support in PA. Evenson et al.'s (2009) combined qualitative and quantitative study using data from female focus group participants (n=58) and survey participants (n=1535) found that the primary interpersonal barrier to PA was social support. Interestingly, lack of social support was discussed in all four Hispanic focus groups but only in one of the four white focus groups and two of the five African-American groups, which may imply cultural differences to perceived barriers which need to be taken into account. Many participants cited the need for external motivation to engage in PA, and cited the influence of family members, including their husbands or children, as barriers or motivators depending on the family members' attitude. Santos et al. (2014) found in their longitudinal study of Portuguese women that lack of social support was infrequently cited as a barrier to PA; however, Evenson et al. (2009) noted that it was only in the focus groups, rather than the quantitative part of their study that social support was mentioned as a barrier to PA so this may explain the contrast in results. Evenson et al.'s (2009) qualitative research was useful in its ability to provide excerpts from the data, thus complementing quantitative studies. However, some of the thirteen focus groups were small in size which may have interfered with reaching data saturation.

Leiferman, Swibas, Koiness, Marshall, and Dunn (2011) carried out individual and paired interviews with 25 women of low socioeconomic status in their second or third trimesters who were classed as 'exercisers' or 'non-exercisers' (those who engaged in PA for less than 60 minutes per week). Findings suggested that non-exercisers lacked emotional and informational PA support, particularly from friends and family. In contrast, emotional support and a sense of accountability to friends and family acted as facilitators to PA. There was evidence of coding inter-rater reliability to help prevent analysis bias; however, as with most of the qualitative research in this review, there was a paucity of information about who conducted the interviews, although the study does note that the lead researcher and another member of the research team analysed the data.

Further qualitative research regarding the influence of social support comes from Fieril, Olsén, Glantz, and Larsson (2014) who used inductive content analysis to describe the experiences of PA in women who performed regular resistance training throughout pregnancy. Social reproach and lack of understanding from others about engaging in PA were experienced by a number of the women, with reports that family and friends often questioned their choice to continue training throughout pregnancy. Some also reported a sense of exclusion and 'not fitting in' at fitness centres where non-pregnant women exercised, generating a sense that pregnancy was a disease. These psychosocial barriers to PA have not been found in previous studies, potentially because this study solely sampled women who were regular exercisers. There was a clear overview of analyses and a number of example quotes to illustrate codes (rather than just categories) which had been missing in other qualitative studies, as well as an insightful reflection on the power

dynamics between the investigators and participants, which again has been absent from other research.

Cultural norms. A criticism of the majority of research on PA in pregnancy is its focus on white, middle class women as participants. A number of studies in this review have specifically carried out research with minority ethnic groups (e.g. Evenson et al., 2009; Goodrich et al., 2013; Groth & Morrison-Beedy, 2013) in order to further research in this area. In some studies, cultural differences between participants have been noted in the perception of barriers to PA.

Differences in perceived informational support were noted by Marquez et al. (2009) in a study involving three focus groups - two for Latina women and one for white, non-Latina women. Content analysis of the transcripts showed that Latina women reported lack of information about PA in pregnancy as an important barrier but this was not the case for non-Latina women. This contrasts other research (e.g. Weallens et al., 2003) which shows that lack of informational support can also be a PA barrier for non-Latina women, thus differences might be attributed to other factors (e.g. economic status, education level), which the investigators do acknowledge.

Thornton et al.'s (2006) study specifically focussed on the role of social support for pregnant and post-partum Latina women and interviewed participants with their partner or another family member they considered influential to their beliefs about PA. Participants were given a small monetary reward; however, there was no consideration of the power dynamics in the research, nor any reflection on the analytic process, which weakened its credibility. The investigators used an inductive analytic procedure to code the data and found that husbands provided the main source of informational support for increasing PA; conversely, social isolation and

lack of support from husbands were barriers to regular PA. Evenson et al.'s (2009) research supported these findings, highlighting the importance of social support in Latina women. Evenson et al. (2009) also suggested that these women generally placed more value on their families' advice and cultural customs than on advice from medical professionals.

Further information about the role of culture with regard to social support comes from Kieffer, Willis, Arellano, and Guzman (2002). They used three focus groups over a period of six months to collect data from 22 pregnant and post-partum Latina women in Detroit, USA. Most participants attended all three groups. They found that social isolation was an important PA barrier; this was attributed to family concerns about appropriate maternal behaviour. Disapproval from husbands and mothers about the appropriateness of PA was also seen as a barrier. Some participants reported that lack of PA was part of a cultural lifestyle pattern, where Latina women were seen as more likely to live a sedentary lifestyle during pregnancy whereas Anglo women were more likely to exercise. This study would have benefitted from a clearer delineation in the results section between barriers during and after pregnancy, as this was not always clear.

The studies sampling Latina women tended to emphasise the role of social and family norms in decision-making related to PA during pregnancy. In the context of the TPB, this suggests that social norms may be a stronger predictor of intention to engage in PA in the Latino community - a collectivist culture - than attitude or PBC (Van Hooft & De Jong, 2009). This would contrast the findings of the 'intention' studies reviewed, which used predominantly White-American populations.

Doran and O'Brien's (2007) Australia-based research specifically aimed to explore women's views and cultural beliefs related to the importance of PA in

pregnancy. They used a purposive sample of women from different cultural groups (Indigenous women from New South Wales, women from Western Samoan background, and Anglo-Saxon women) for four focus groups comprised of 17 women in total. Thematic analysis showed that no cultural influences were reported by Indigenous women; however, Samoan women reported that pregnancy was considered a time of rest, with one woman likening it to 'a cotton wool experience'. As this was a brief report it lacked sufficient information in most areas including the investigator's accounts of methods used, analytical choice, and the results (although supporting quotes from the transcripts were provided). No reflexivity of the research process was demonstrated.

Krans and Chang (2011) used participants (n=34) from six focus groups to explore barriers and facilitators to PA in low-income, African-American women by using a grounded theory approach. Several participants discussed how African-American culture affected motivation to engage in PA. Many noted that their family members were not physically active, and the importance of regular PA was not talked about routinely. Instead, women emphasised the role of food in African-American culture, often contributing to obesity, as being more of a focus than PA.

Social modelling. Research has highlighted the role of social modelling related to PA. Haakstad, Voldner, Henriksen, and Bo (2009) conducted a cross-sectional study which compared exercisers and non-exercisers based on their adherence to official PA guidelines. Multivariate analysis indicated that having no role models with regards to PA in childhood was associated with decreased PA in the third trimester ($p < .05$). However, only 40 of the 467 participants were classed as exercisers, thus the study has very limited power and results should be interpreted

with caution. This was also the case with Leiferman et al.'s (2011) small scale research of 25 women which found that both exercisers and non-exercisers cited absence of social norms that encouraged PA and/or social modelling of PA to be barriers.

Discussion

The aims of this review were to explore and critique the findings of existing literature focussing on psychosocial barriers to PA during pregnancy, consider the clinical implications of the existing research and identify research gaps in the literature.

Methodological Limitations

There was little consistency in the way barriers were measured in the quantitative research. Many studies relied on investigator developed barrier questionnaires which increased the risk of missing salient barriers. The way in which PA was measured also varied across studies (e.g. some excluded leisure-time activities such as work and household chores whilst others included them), making comparison difficult.

When standardised questionnaires were used (e.g. MAQ, LTEQ) they were often not validated for pregnant populations. Investigators often adapted the questionnaires, thus their validity and reliability may be questionable. The use of self-report PA measures also raised questions about reliability, and few used objective measures such as accelerometers.

Much of the literature was cross-sectional in design, making identification of causality difficult. Given that pregnancy is a time of rapid bio-psycho-social change,

longitudinal studies were helpful in exploring barriers across pregnancy rather than at one specific time point.

A number of studies focussing on the experience of PA in pregnancy sampled women retrospectively, with the time between birth and research participation varying significantly between studies, from one day post-birth (Weallens et al., 2003) to four years (Fieril et al., 2014), risking recall bias.

In qualitative studies, none demonstrated reflexivity apart from Weir et al. (2010), and only one acknowledged the balance of power in the research study (Fieril et al., 2014). Many lacked detail about the type of analysis used. For those that did report the type, content analysis was the most common, although some used a socio-economic framework, some thematic analysis and three used grounded theory.

Most studies were carried out in America and subject to cultural bias due to the focus on white, university educated, middle class women. Whilst the TPB has been applied extensively in Western societies, limited empirical evidence exists supporting its validity in other cultural groups (Lee, Hubbard, O'Riordan, & Kim, 2006). Studies using the TPB as a theoretical framework therefore need to be cautious about the generalisability of findings. All reviewed studies were based on Western guidance indicating that PA during pregnancy is beneficial; however, not all cultures share this belief. In parts of Thailand for example, maternal confinement before birth is still seen as crucial in ensuring the safety and wellbeing of mother and infant (Liamputtong, Yimyam, Parisunyakul, Baosoung, & Sansiriphun, 2005).

Implications for Clinical Practice

Understanding women's decision-making regarding PA engagement during pregnancy is a complex process. This review has focussed on the psychosocial barriers to PA as they are more easily modified and targeted for intervention than physiological barriers (Cramp & Bray, 2009).

The majority of studies provided useful clinical recommendations. Healthcare professionals, particularly midwives, should be encouraged to provide clear information about the benefits of PA and reduce misperceptions of risk for pregnant women and their partners. This is important for women with a history of miscarriage or who have undergone fertility treatment, as they are likely to be more concerned about the risk of PA to the baby and may be at increased risk of antenatal depression or anxiety.

Sedentary pregnant women experience higher levels of anxiety and depression (Goodwin et al., 2000; Claesson et al., 2014). Clinical psychologists should be aware that pregnant women experiencing low mood or anxiety may benefit from increasing their level of PA, and PA may form a part of a psychological intervention (e.g. behavioural activation). Clinical psychologists should also be mindful of potential barriers to PA engagement. Fears about exercising in pregnancy could be explored with clients and addressed using psycho-educational material. For women who have experienced previous miscarriage or undergone fertility treatment, support may include bereavement and trauma work in order to help improve mood and facilitate engagement in daily activities such as PA. Motivational interviewing could be used to increase self-efficacy or motivation. Clinical psychologists could offer training or consultation to obstetric team professionals (e.g. midwives) to improve psychosocial understandings of the challenges pregnant women face regarding PA engagement. Training topics could include the TPB and

the barriers pregnant women face to PA, the benefits of PA on emotional well-being, and motivational interviewing techniques to improve PA engagement.

Multidisciplinary teams which include a psychologist have been found to be effective in supporting and treating obese pregnant women by using behavioural interventions (Laddu, Dow, Hingle, Thomson, & Going, 2011). Audit evaluation of such interventions could be implemented by a clinical psychologist.

Research cited the importance of familial emotional support in some women's PA decision-making (particularly in the Latino community), suggesting that normative beliefs can influence behaviour. It may therefore be helpful to involve families in interventions to improve PA adherence. Collaboratively exploring how cultural PA beliefs fit with professional recommendations will also form an important part of the work.

Social and emotional support could be increased through group PA activities aimed at pregnant women which may diminish the sense of exclusion they experience in other fitness settings.

Implications for Future Research

The use of theory (e.g. TPB; Ajzen, 1991; Lupton, 1999) to guide research was explicit in some studies and provided a useful framework of understanding. Future research could focus on exploring the validity of using the TPB to explain PA behaviour during pregnancy in non-Western cultures. Research to develop alternative explanations for PA behaviour during pregnancy (e.g. by using a grounded theory method) would help guide clinical practice due to the paucity of theory in this area.

Many quantitative studies lacked validated questionnaires and did not provide sufficient opportunity for exploration of the barriers to PA. Large scale studies with validated measures, preferably including open-ended questions, are needed in future quantitative research to increase the validity of research. The use of randomised control trials to test interventions designed to overcome reported barriers to PA would be useful to assess whether this had an effect on PA behaviour.

Pearce (2009) stressed the need for qualitative approaches to explore what PA means to individuals and how they incorporate it into their lives; however, most qualitative research relied on content analysis. Cioffi et al. (2010) listed 'the meaning of PA' as a category in their findings, but their use of descriptive analysis precluded a deeper understanding of what PA meant for the women who engaged in PA and those who did not. Qualitative studies of PA using other methodologies such as Interpretative Phenomenological Analysis (IPA), grounded theory, and narrative methodologies have been useful in furthering a psychological understanding of the role of PA in other populations (e.g. Crone & Guy, 2008; Knowles, Niven, & Fawkner, 2011), but appear to be missing in the reviewed research.

Research into the PA behaviour and experiences of particular groups (e.g. women of different ethnicities, women who have undergone fertility treatment) is scarce in the literature but important, as these populations may face unique barriers to PA. Further qualitative or quantitative research into understanding the experiences of, and/or barriers to, PA for these women may help inform future health interventions.

References

- Aittasalo, M., Pasanen, M., Fogelholm, M., & Ojala, K. (2010). Validity and repeatability of a short pregnancy leisure time physical activity questionnaire. *Journal of Physical Activity and Health, 7*, 109-118. Retrieved from <http://www.humankinetics.com/acucustom/sitename/Documents/DocumentItem/17728.pdf>
- American Congress of Obstetricians and Gynaecologists. (2002). *Exercise during pregnancy and the postpartum period* (ACOG Committee Opinion No. 267). Retrieved from <http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Exercise-During-Pregnancy-and-the-Postpartum-Period>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211. doi: 10.1016/0749-5978(91)90020-T
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4*, 359-373. doi: 10.1521/jscp.1986.4.3.359

Bennett, H. A., Einarson, A., Taddio, A., Koren, G., & Einarson, T. R. (2004).

Prevalence of depression during pregnancy: systematic review. *Obstetrics & Gynecology*, *103*, 698-709. Doi: 10.1097/01.AOG.0000116689.75396.5f

Brown, W. J., & Trost, S. G. (2003). Life transitions and changing physical activity patterns in young women. *American Journal of Preventative Medicine*, *25*, 140-143. doi: 10.1016/S0749-3797(03)00119-3

Cioffi, J., Schmied, V., Dahlen, H., Mills, A., Thornton, C., Duff, M., . . . Kolt, G. S. (2010). Physical activity in pregnancy: Women's perceptions, practices, and influencing factors. *Journal of Midwifery & Women's Health*, *55*, 455-461. doi:10.1016/j.jmwh.2009.12.003

Chasan-Taber, L., Schmidt, M. D., Roberts, D. E., Hosmer, D., Markenson, G., Freedson, P. S. (2004). Development and validation of a pregnancy physical activity questionnaire. *Medicine & Science in Sports & Exercise*, *36*, 1750-1760. doi: 10.1249/01.MSS.0000142303.49306.0D

Claesson, I. M., Klein, S., Sydsjö, G., & Josefsson, A. (2014). Physical activity and psychological well-being in obese pregnant and postpartum women attending a weight-gain restriction programme. *Midwifery*, *30*, 11-16. doi: 10.1016/j.midw.2012.11.006

Clapp, J. F. (1990). The course of labor after endurance exercise during pregnancy.

American Journal of Obstetrics and Gynecology, *163*, 1799–1805. doi:

10.1016/0002-9378(90)90753-T

Clarke, P. E., & Gross, H. (2004). Women's behaviour, beliefs and information

sources about physical exercise in pregnancy. *Midwifery*, *20*, 133-141. doi:

10.1016/j.midw.2003.11.003

Craig, C. L., Marshall, A. L., Sjoström, M., Bauman, A. E., Booth, M. L., Ainsworth, B.

E., . . . Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine & Science in Sports & Exercise*, *35*, 1381-1395.

doi: 10.1249/01.MSS.0000078924.61453.FB

Cramp, A. G., & Bray, S. R. (2009). A prospective examination of exercise and

barrier self-efficacy to engage in leisure-time physical activity during pregnancy.

Annals of Behavioral Medicine, *37*, 325-334. doi:10.1007/s12160-009-9102-y

Crone, D., & Guy, H. (2008). 'I know it is only exercise, but to me it is something that

keeps me going': A qualitative approach to understanding mental health service users' experiences of sports therapy. *International Journal of Mental Health*

Nursing, *17*, 197-207. doi: 10.1111/j.1447-0349.2008.00529.x

Da Costa, D., & Ireland, K. (2013). Perceived benefits and barriers to leisure-time physical activity during pregnancy in previously inactive and active women.

Women & Health, *53*, 185-202. doi:10.1080/03630242.2012.758219

- Da Costa, D., Rippen, N., Dritsa, M., & Ring, A. (2003). Self-reported leisure-time physical activity during pregnancy and relationship to psychological well-being. *Journal of Psychosomatic Obstetrics & Gynecology, 24*, 111-119. doi: 10.3109/01674820309042808
- Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY: University of Rochester Press.
- Doran, F., & O'Brien, A. P. (2007). A brief report of attitudes towards physical activity during pregnancy. *Health Promotion Journal of Australia : Official Journal of Australian Association of Health Promotion Professionals, 18*, 155-158.
- Downs, D. S., Chasan-Taber, L., Evenson, K. R., Leiferman, J., & Yeo, S. (2012). Physical activity and pregnancy: Past and present evidence and future recommendations. *Research Quarterly for Exercise and Sport, 83*, 485-502. doi: 10.1080/02701367.2012.10599138
- Duncombe, D., Wertheim, E. H., Skouteris, H., Paxton, S. J., & Kelly, L. (2009). Factors related to exercise over the course of pregnancy including women's beliefs about the safety of exercise during pregnancy. *Midwifery, 25*, 430-438. doi: 10.1016/j.midw.2007.03.002

Evenson, K. R., & Bradley, C. B. (2010). Beliefs about exercise and physical activity among pregnant women. *Patient Education and Counseling*, *79*, 124-129. doi: 10.1016/j.pec.2009.07.028

Evenson, K. R., Moos, M., Carrier, K., & Siega-Riz, A. M. (2009). Perceived barriers to physical activity among pregnant women. *Maternal and Child Health Journal*, *13*, 364-375. doi:10.1007/s10995-008-0359-8

Evenson, K. R., & Wen, F. (2010). Measuring physical activity among pregnant women using a structured one-week recall questionnaire: evidence for validity and reliability. *International Journal of Behavioral Nutrition and Physical Activity*, *7*:21. doi: 10.1186/1479-5868-7-21

Ezmerli, N. M. (2000). Exercise in pregnancy. *Primary Care Update for Ob/Gyns*, *7*, 260-265. doi: 10.1016/S1068-607X(00)00056-1

Fieril, K. P., Olsén, M. F., Glantz, A., & Larsson, M. (2014). Experiences of exercise during pregnancy among women who perform regular resistance training: A qualitative study. *Physical Therapy*, *94*, 1135-1143. doi:10.2522/ptj.20120432

Gaston, A., & Cramp, A. (2011). Exercise during pregnancy: A review of patterns and determinants. *Journal of Science and Medicine in Sport*, *14*, 299-305. doi: 10.1016/j.jsams.2011.02.006

- Gaston, A., Cramp, A., & Prapavessis, H. (2012). Enhancing self-efficacy and exercise readiness in pregnant women. *Psychology of Sport and Exercise, 13*, 550-557. doi: 10.1016/j.psychsport.2012.03.001
- Gaston, A., Wilson, P. M., Mack, D. E., Elliot, S., & Prapavessis, H. (2013). Understanding physical activity behavior and cognitions in pregnant women: An application of self-determination theory. *Psychology of Sport and Exercise, 14*, 405-412. doi:10.1016/j.psychsport.2012.12.009
- Godin, G., Desharnais, R., Valois, P., Lepage, L., Jobin, J., & Bradet, R. (1994). Differences in perceived barriers to exercise between high and low intenders: Observations among different populations. *American Journal of Health Promotion, 8*, 279-385. doi:10.4278/0890-1171-8.4.279
- Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behaviour in the community. *Canadian Journal of Applied Sport Sciences, 10*, 141-146.
- Goodrich, K., Cregger, M., Wilcox, S., & Liu, J. (2013). A qualitative study of factors affecting pregnancy weight gain in African American women. *Maternal and Child Health Journal, 17*, 432-440. doi:10.1007/s10995-012-1011-1
- Goodwin, A., Astbury, J., & McMeeken, J. (2000). Body image and psychological well-being in pregnancy: A comparison of exercisers and non-exercisers. *The Australian and New Zealand Journal of Obstetrics and Gynaecology, 40*, 442-447. doi: 10.1111/j.1479-828X.2000.tb01178.x

- Groth, S. W., & Morrison-Beedy, D. (2013). Low-income, pregnant, African American women's views on physical activity and diet. *Journal of Midwifery & Women's Health, 58*, 195-202. doi:10.1111/j.1542-2011.2012.00203.x
- Haakstad, L. A. H., Voldner, N., Henriksen, T., & Bo, K. (2009). Why do pregnant women stop exercising in the third trimester? *Acta Obstetrica Et Gynecologica Scandinavica, 88*, 1267-1275. doi:10.3109/00016340903284901
- Halpert, J. A., Wilson, M. L., & Hickman, J. L. (1993). Pregnancy as a source of bias in performance appraisals. *Journal of Organizational Behavior, 14*, 649-663. doi: 10.1002/job.4030140704
- Hanghøj, S. (2013). When it hurts I think: Now the baby dies. Risk perceptions of physical activity during pregnancy. *Women and Birth, 26*, 190-194. doi:10.1016/j.wombi.2013.04.004
- Hanson, C. (2004). *A cultural history of pregnancy: Pregnancy, medicine and culture 1750-2000*. New York, NY: Palgrave Macmillan.
- Hashemieh, C., Neisani-Samani, L., Taghinejad, H. (2011). Assessment of anxiety in pregnancy following assisted reproductive technology (ART) and associated infertility factors in women commencing treatment. *Iranian Red Crescent Medical Journal, 15*: e14465. doi: 10.5812/ircmj.14465

- Hausenblas, H., Downs, D. S., Giacobbi, P., Tuccitto, D., & Cook, B. (2008). A multilevel examination of exercise intention and behavior during pregnancy. *Social Science & Medicine*, *66*, 2555-2561.
doi:10.1016/j.socscimed.2008.02.002
- Hausenblas, H., Giacobbi, P., Cook, B., Rhodes, R., & Cruz, A. (2011). Prospective examination of pregnant and nonpregnant women's physical activity beliefs and behaviours. *Journal of Reproductive and Infant Psychology*, *29*, 308-319.
doi:10.1080/02646838.2011.629993
- Hausenblas, H. A., & Symons Downs, D. (2004). Prospective examination of the theory of planned behavior applied to exercise behavior during women's first trimester of pregnancy. *Journal of Reproductive and Infant Psychology*, *22*, 199-210. doi:10.1080/02646830410001723788
- Hegaard, H. K., Kjaergaard, H., Damm, P. P., Petersson, K., & Dykes, A. (2010). Experiences of physical activity during pregnancy in Danish nulliparous women with a physically active life before pregnancy: A qualitative study. *BMC Pregnancy and Childbirth*, *10*:33. doi:10.1186/1471-2393-10-33
- Hegaard, H. K., Pedersen, B. K., Nielsen, B., & Damm, P. (2007). Leisure time physical activity during pregnancy and impact on gestational diabetes mellitus, pre-eclampsia, preterm delivery and birth weight: A review. *Acta Obstetrica Et Gynecologica Scandinavica*, *86*(11), 1290-1296.
doi:10.1080/00016340701647341

- Hinton, P. S., & Olson, C. M. (2001). Postpartum exercise and food intake: The importance of behavior-specific self-efficacy. *Journal of the American Dietetic Association, 101*, 1430-1437. doi:10.1016/S0002-8223(01)00345-5
- Kieffer, E. C., Willis, S. K., Arellano, N., & Guzman, R. (2002). Perspectives of pregnant and postpartum latino women on diabetes, physical activity, and health. *Health Education & Behavior, 29*, 542-556. doi:10.1177/109019802237023
- Knowles, A. M., Niven, A., & Fawkner, S. (2011). A qualitative examination of factors related to the decrease in physical activity behavior in adolescent girls during the transition from primary to secondary school. *Journal of Physical Activity & Health, 8*, 1084-1091. Retrieved from http://strathprints.strath.ac.uk/42331/1/07_knowles_JPAH_20090345_wg.pdf
- Krans, E. E., & Chang, J. C. (2011). A will without a way: Barriers and facilitators to exercise during pregnancy of low-income, African American women. *Women & Health, 51*, 777-794. doi:10.1080/03630242.2011.633598
- Kriska, A. M., Knowler, W. C., LaPorte, R. E., Drash, A. L., Wing, R. R., Blair, S. N., . . . Kuller, L. H. (1990). Development of questionnaire to examine relationship of physical activity and diabetes in Pima Indians. *Diabetes Care, 13*, 401-411. doi:10.2337/diacare.13.4.401

Kroll, T., Kehn, M., Ho, P. S., & Groah, S. (2007). The SCI exercise self-efficacy scale (ESES): Development and psychometric properties. *International Journal of Behavioral Nutrition and Physical Activity*, 4: 34. doi:10.1186/1479-5868-4-34

Labs, S. M., & Wurtele, S. K. (1986). Fetal health locus of control scale: Development and validation. *Journal of Consulting and Clinical Psychology*, 54, 814-819. doi:10.1037/0022-006X.54.6.814

Laddu, D., Dow, C., Hingle, M., Thomson, C., & Going, S. (2011). A review of evidence-based strategies to treat obesity in adults. *Nutrition in Clinical Practice*, 26, 512-525. doi:10.1177/0884533611418335

Lee, H., Hubbard, A. S. E., O'Riordan, C. K., & Kim, M. S. (2006). Incorporating culture into the theory of planned behavior: Predicting smoking cessation intentions among college students. *Asian Journal of Communication*, 16, 315-322. doi: 10.1080/01292980600857880

Leiferman, J., Swibas, T., Koiness, K., Marshall, J. A., & Dunn, A. L. (2011). My baby, my move: Examination of perceived barriers and motivating factors related to antenatal physical activity. *Journal of Midwifery & Women's Health*, 56(1), 33-40. doi:10.1111/j.1542-2011.2010.00004.x

Leppanen, M., Aittasalo, M., Raitanen, J., Kinnunen, T. I., Kujala, U. M., & Luoto, R. (2014). Physical activity during pregnancy: Predictors of change, perceived support and barriers among women at increased risk of gestational diabetes.

Maternal and Child Health Journal, 18, 2158-2166. doi:10.1007/s10995-014-1464-5

Liamputtong, P., Yimyam, S., Parisunyakul, S., Baosung, C., & Sansiriphun, N. (2005). Traditional beliefs about pregnancy and child birth among women from Chiang Mai, Northern Thailand. *Midwifery*, 21, 139-153. doi: 10.1007/978-90-481-2599-9_15

Lupton, D. (1999). Risk and the ontology of pregnant embodiment. In D. Lupton (Ed.), *Risk and sociocultural theory: New directions and perspectives* (pp. 59-85). Cambridge: Cambridge University Press.

Marquez, D. X., Bustamante, E. E., Bock, B. C., Markenson, G., Tovar, A., & Chasan-Taber, L. (2009). Perspectives of Latina and non-Latina white women on barriers and facilitators to exercise in pregnancy. *Women & Health*, 49, 505-521. doi:10.1080/03630240903427114

Marquez-Sterling, S., Perry, A. C., Kaplan, T., Halberstein, R. A., & Signorile, J. F. (2000). Physical and psychological changes with vigorous exercise in sedentary primigravidae. *Medicine & Science in Sports & Exercise*, 32, 58-62. doi:10.1097/00005768-200001000-00010

Marshall, E. S., Bland, H., & Melton, B. (2013). Perceived barriers to physical activity among pregnant women living in a rural community. *Public Health Nursing*, 30, 361-369. doi:10.1111/phn.12006

Melton, B., Marshall, E., Bland, H., Schmidt, M., & Guion, W. K. (2013). American rural women's exercise self-efficacy and awareness of exercise benefits and safety during pregnancy. *Nursing & Health Sciences, 15*(4), 468-473.

doi:10.1111/nhs.12057

Mottola, M., & Campbell, M. (2003). Activity patterns during pregnancy. *Canadian Journal of Applied Physiology, 28*, 642–653. doi:10.1139/h03-049

Mudd, L. M., Nechuta, S., Pivarnik, J. M., Paneth, N., & Michigan Alliance for National Children's Study (2009). Factors associated with women's perceptions of physical activity safety during pregnancy. *Preventive Medicine, 49*, 194-199.

doi:10.1016/j.ypmed.2009.06.004

Mullan, E., Markland, D., & Ingledew, D. K. (1997). A graded conceptualisation of self-determination in the regulation of exercise behaviour: Development of a measure using confirmatory factor analytic procedures. *Personality and Individual Differences, 23*, 745-752. doi:10.1016/S0191-8869(97)00107-4

NICE (2010). *Weight management before, during, and after pregnancy*. Retrieved from <http://www.nice.org.uk/guidance/ph27>

Office for National Statistics (2015). *Births and deaths in England and Wales, 2014* (p. 8). London: Office for National Statistics.

Pearce, P. F. (2009). Physical activity: Not just for quantitative researchers.

Qualitative Health Research, 19, 879-880. doi:10.1177/1049732309338199

Poudevigne, M. S., & O'Connor, P. J. (2006). A review of physical activity patterns in pregnant women and their relationship to psychological health. *Sports Medicine*, 36, 19-38. doi:10.2165/00007256-200636010-00003

Pols, M. A., Peeters, P. H. M., Bueno-de-Mesquita, H. B., Ocké, M. C., Wentink, C. A., Kemper, H. C. G., & Collette, H. J. A. (1995). Validity and repeatability of a modified Baecke questionnaire on physical activity. *International Journal of Epidemiology*, 24, 381-388. doi: 10.1093/ije/24.2.381

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLOS Medicine*, 6(7), e1000097. doi:10.1371/journal.pmed.1000097

Royal College of Obstetricians and Gynaecologists. (2006). *Exercise in pregnancy* (Statement No. 4). Retrieved from <https://www.rcog.org.uk/globalassets/documents/guidelines/statements/statement-no-4.pdf>

Royal College of Psychiatrists (2012). *Mental health in pregnancy*. Retrieved from <http://www.rcpsych.ac.uk/healthadvice/problemsdisorders/mentalhealthinpregnancy.aspx>

- Santos, P. C., Abreu, S., Moreira, C., Lopes, D., Santos, R., Alves, O., . . . Mota, J. (2014). Impact of compliance with different guidelines on physical activity during pregnancy and perceived barriers to leisure physical activity. *Journal of Sports Sciences, 32*, 1398-1408. doi:10.1080/02640414.2014.893369
- Schoenfeld, B., & Tiryaki-Sönmez, G. (2011). Overcoming psychosocial barriers to maternal exercise: intervention strategies to improve participation and adherence. *Biomedical Human Kinetics, 3*, 61-66. doi: 10.2478/v10101-011-0014-5
- Stengel, M. R., Kraschnewski, J. L., Hwang, S. W., Kjerulff, K. H., & Chuang, C. H. (2012). "What my doctor didn't tell me": Examining health care provider advice to overweight and obese pregnant women on gestational weight gain and physical activity. *Women's Health Issues, 22*, 535-540. doi: 10.1016/j.whi.2012.09.004
- Symons Downs, D., & Hausenblas, H. A. (2003). Exercising for two: Examining pregnant women's second trimester exercise intention and behavior using the framework of the theory of planned behavior. *Women's Health Issues, 13*, 222-228. doi: 10.1016/j.whi.2003.09.004
- Symons Downs, D., & Hausenblas, H. A. (2004). Women's exercise beliefs and behaviors during their pregnancy and postpartum. *Journal of Midwifery & Women's Health, 49*, 138-144. doi:10.1016/j.jmwh.2003.11.009

- Thornton, P. L., Kieffer, E. C., Salabarria-Pena, Y., Odoms-Young, A., Willis, S. K., Kim, H., & Salinas, M. A. (2006). Weight, diet, and physical activity-related beliefs and practices among pregnant and postpartum Latino women: The role of social support. *Maternal and Child Health Journal, 10*, 95-104. doi: 10.1007/s10995-005-0025-3
- Vandenbroucke, J. P., von Elm, E., Altman, D. G., Gøtzsche, P. C., Mulrow, C. D., Pocock, S. J., . . . Egger, M. (2007) Strengthening the reporting of observational studies in epidemiology (STROBE): Explanation and elaboration. *PLOS Medicine, 4*(10), e297. doi:10.1371/journal.pmed.0040297
- Van Hooft, E. A. J., & De Jong, M. (2009). Predicting job seeking for temporary employment using the theory of planned behaviour: The moderating role of individualism and collectivism. *Journal of Occupational and Organizational Psychology, 82*, 295-316. doi: 10.1348/096317908X325322
- Verbrugge, M. H. (2012). *Active bodies: A history of women's physical education in twentieth-century America*. New York, NY: Oxford University Press.
- Vertinsky, P. (1998). "Run, Jane, run": Central tensions in the current debate about enhancing women's health through exercise. *Women & Health, 27*, 81-111. doi: 10.1300/J013v27n04_06

- Vladutiu, C. J., Evenson, K. R., & Marshall, S. W. (2010). Physical activity and injuries during pregnancy. *Journal of Physical Activity & Health, 7* 761-769.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3319730/pdf/nihms366597.pdf>
- Wallace, A. M., Boyer, D. B., Dan, A., & Holm, K. (1986). Aerobic exercise, maternal self-esteem, and physical discomforts during pregnancy. *Journal of Nurse-Midwifery, 31*, 255-262. doi:10.1016/0091-2182(86)90034-0
- Weallens, E., Clark, A., MacIntyre, P., & Gaudoin, M. (2003). A survey of exercise patterns in primigravidae at a Scottish NHS trust: More consistent support and advice required for women and their families. *Health Education Journal, 62*, 234-245. doi:10.1177/001789690306200305
- Weir, Z., Bush, J., Robson, S. C., McParlin, C., Rankin, J., & Bell, R. (2010). Physical activity in pregnancy: A qualitative study of the beliefs of overweight and obese pregnant women. *BMC Pregnancy and Childbirth, 10*:18.
doi:10.1186/1471-2393-10-18
- Wolfe, L. A., & Weissgerber, T. L. (2003). Clinical physiology of exercise in pregnancy: a literature review. *Journal of Obstetrics and Gynaecology Canada, 25*, 473-483.
- World Health Organisation. (2010). *Global recommendations on physical activity for health*. Retrieved from
http://whqlibdoc.who.int/publications/2010/9789241599979_eng.pdf?ua=1

Williamson, J., & Robinson, M. (2006). Psychosocial interventions or integrated programming for wellbeing? *Intervention, 4*, 4-25.

doi:10.1097/01.WTF.0000229526.63438.23

Yardley, L. (2000). Dilemmas in qualitative health research. *Psychology and Health, 15*, 215-228. doi:10.1080/08870440008400302

Yin, R. K. (2003). *Case Study Research: Design and Methods* (3rd ed.). California:

Sage Publications.

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Major Research Project

Section B: Journal Paper¹

Women's Experiences of Physical Activity during a Pregnancy
Resulting from In Vitro Fertilisation Treatment: An Empirical
Study

Word Count: 7995 (833)

¹ This paper is intended for submission to the Journal of Reproductive and Infant Psychology. Where possible, authors' guidelines (Appendix E) have been followed.

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SALOMONS

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Abstract

Physical activity (PA) during pregnancy is safe for both mother and fetus in the majority of cases, including for women who have undergone in vitro fertilisation (IVF) treatment; however, this population is likely to face unique barriers to PA. Currently, there is a paucity of research exploring the qualitative experiences and decision-making processes surrounding PA for women who have undergone IVF treatment. Eight women, who had undergone successful IVF treatment and given birth within the last two years, participated in semi-structured interviews about their experiences of infertility and PA during pregnancy. Interview transcripts were analysed using interpretative phenomenological analysis. Three superordinate themes emerged from the data: 'navigating away from childlessness and towards motherhood', 'negotiating a safe passage', and 'balancing the challenges of pregnancy with the needs of the self'. Ten subthemes indicated the processes adopted to navigate experiences of infertility, the IVF process, and subsequent decision-making about PA during pregnancy. PA during pregnancy was experienced as a way to soothe the self and control the experience of pregnancy; however, this was mediated by concerns about safety and physical limitations on PA. Limitations of the study are considered, as well as implications for clinical practice and directions for future research.

Key words: Pregnancy, infertility, physical activity, in vitro fertilisation, qualitative

Introduction

Physical Activity during Pregnancy

Exercise during pregnancy is safe for mother and fetus in the majority of cases, with official guidance recommending that in the absence of contraindications such as preeclampsia or extreme morbid obesity, women can initiate or continue physical activity (PA)² during pregnancy (Royal College of Obstetricians and Gynaecologists, 2006).

Antenatal PA has a number of benefits. It can increase energy, improve sleep, minimise excessive weight gain, shorten the length of labour and lessen the risk of delivery complications (Clapp, 1990; Ezmerli, 2000). PA can also improve pregnant women's body image (Marquez-Sterling, Perry, Kaplan, Halberstein, & Signorile, 2000), and increase self-esteem (Wallace, Boyer, Dan, & Holm, 1986). Even low-intensity PA can enhance psychological wellbeing (Da Costa, Rippen, Dritsa, & Ring, 2003). Exercise is therefore a vital component in managing both the physical and psychological challenges of a healthy pregnancy.

Despite this research and official advice, PA behaviour is often avoided or significantly decreased during pregnancy (Brown & Trost, 2003; Mottola & Campbell, 2003), increasing the risk of maternal psychological and physical health

² The term 'PA' encompasses, but is not limited to, exercise (World Health Organisation, 2010).

complications. The decision-making process of PA engagement can be complex, and research has tried to further our understanding of PA behaviour during pregnancy.

Explanations of PA Behaviour

Research has used the Theory of Planned Behaviour (TPB; Ajzen, 1991) to measure pregnant women's intentions to engage in PA during pregnancy, highlighting attitude (underlying beliefs about the positive or negative outcomes of PA) and perceived behavioural control (PBC; the perceived ease or difficulty of the behaviour) as important predictors of PA behaviour (Hausenblas & Symons Downs, 2004; Symons Downs & Hausenblas, 2003). Beliefs about the perceived value of PA therefore form part of the decision-making process. These may be shaped by social, cultural, and psychological factors, as well as a person's previous experiences.

Risk is a recurring theme throughout the literature, with research showing that safety concerns about PA can prevent women from exercising. Beliefs that it can cause miscarriage, injury, and premature labour are not uncommon (Goodrich, Cregger, Wilcox, & Liu, 2013; Hausenblas, Giacobbi, Cook, Rhodes, & Cruz, 2011). Views that low to moderate PA is unsafe predict a decrease in the amount of time spent engaging in PA across pregnancy (Duncombe, Wertheim, Skouteris, Paxton, & Kelly, 2009). Hegaard, Kjaergaard, Damm, Petersson, and Dykes (2010) found that 'carefulness' was a major theme in women's discussions about PA, which included pervasive worries about harming the foetus, whilst Cioffi et al. (2010) found that participants emphasised the importance of protecting oneself and the baby. Lack of,

or conflicting, information from health professionals and family can also affect beliefs about PA (Clarke & Gross, 2004; Leppanen et al., 2014).

In contrast, intrinsic motivation - doing something because it is personally rewarding - is associated with fewer perceived barriers to PA (Gaston, Wilson, Mack, Elliot, & Prapavessis, 2013). Self-efficacy regarding one's ability to overcome PA barriers is positively related to PA behaviour (Hinton & Olson, 2001). Social and emotional support (Evenson, Moos, Carrier, & Siega-Riz, 2009) and cultural norms (Krans & Chang, 2011) can also influence women's beliefs and affect PA behaviour.

Whilst research has provided a valuable understanding of the factors which inform the PA decision-making process in the general pregnant population, research has focussed less on more complex pregnancies, particularly women who have undergone in vitro fertilisation (IVF) treatment. This population faces unique psychological and physical challenges, thus women's experiences of PA may differ from the general population.

Infertility and IVF

Reproduction is a key component of adult development and identity, thus infertility can challenge a person's core beliefs about themselves and the world (Diamond, Kezur, Meyers, Scharf, & Weinschel, 1999). It can lead to feelings of loss of control over one's life, and challenge the notion that couples are in charge of their own reproduction (Cousineau & Domar, 2007). Infertility diagnosis and treatment can also instil a detrimental view of oneself as 'abnormal' (Johnson & Fledderjohann, 2012; Jutel, 2009). IVF is one of the primary methods used to help couples experiencing fertility problems conceive, with 49,636 women undergoing IVF or intra-

cytoplasmic sperm injection treatment (ICSI)³ in the UK in 2013 (Human Fertilisation and Embryology Authority, 2014). Both methods involve stimulating the ovaries, after which collected eggs are fertilised with sperm outside the body, with one or two resulting embryos placed into the womb (National Institute for Health and Care Excellence [NICE], 2013). Success rates vary, and undergoing IVF is known to be a physical, emotional, and relational strain for couples (Boivin et al., 2012). Prevalence rates of depression and anxiety for women during IVF treatment have been estimated at 15-20% (Chiaffarino et al., 2011; Reading, Chang, & Kerin, 1989).

IVF and Activity

Guidance given to women undergoing IVF treatment has traditionally advocated bed rest following embryo transfer, with a resumption of normal activities after pregnancy confirmation. However, a recent review found insufficient evidence to support the efficacy of bed rest, arguing that the restriction of PA following embryo transfer may actually increase already heightened levels of anxiety (Küçük, 2012), potentially increasing distress and decreasing the likelihood of regular PA throughout pregnancy.

Naturally conceiving women perceive rest and relaxation during pregnancy to be more important than regular exercise (Clarke & Gross, 2004). This appears to be the case for IVF mothers as well, as most restricted their daily activities following treatment, against medical advice (Su, Chen, Hung, & Yang, 2001). Even after confirmation of pregnancy, IVF mothers are significantly more anxious about the wellbeing of their unborn babies than healthy controls, experiencing a persistent fear

³ Techniques mainly differ in terms of the number of sperm the egg has the opportunity to fertilise with, therefore the term 'IVF' will be used to refer to both IVF and ICSI treatment.

of miscarriage even during their third trimester (McMahon, Ungerer, Beaurepaire, Tennant, & Saunders, 1997). Although many women worry to some degree about engaging in PA (which can influence PA behaviour to varying degrees), pregnant women who have undergone fertility treatment are often the most concerned (Hegaard et al., 2010). Experiences of infertility and miscarriage can result in women preparing less for birth and motherhood throughout pregnancy in order to protect themselves from potential disappointment (McMahon, Tennant, Ungerer, & Saunders, 1999).

Rationale and Aims

Previous studies involving IVF populations have been largely quantitative, generating information about health behaviours, including PA, by using questionnaires (Domar, Conboy, Denardo-Roney, & Rooney, 2012; McMahon et al., 1999). Qualitative studies have provided useful information about the barriers to PA during pregnancy; however, most relied on content analysis, precluding a deeper understanding of the experience of PA. Some included women who had undergone fertility treatment (Cioffi et al., 2010), although this was not the main focus of the research. Others specifically excluded them (Santos et al., 2014). There does not appear to be any research to date exploring the experiences of PA for women who have undergone IVF treatment. Qualitative studies of PA have been useful in furthering a psychological understanding of its role in other populations (e.g. Crone & Guy, 2008; Knowles, Niven, & Fawkner, 2011), and this study aimed to extend the current pregnancy literature by doing the same for IVF mothers, thereby increasing our understanding of the role of PA in this population and providing useful clinical and research recommendations.

Research Questions

The two research questions were:

1. What are the experiences of infertility for women who subsequently undergo IVF treatment?
2. How do experiences of PA during pregnancy for women who have undergone IVF treatment inform the PA decision-making process?

Methodology

Design

Individual semi-structured interviews were used as an effective way of eliciting detailed stories, thoughts, and feelings from participants. They facilitate rapport and allow in-depth discussion about participants' experiences to take place, enabling participants to think, speak and be heard (Smith, Flowers, & Larkin, 2009).

Epistemological position. Given the complex sociocultural context that people exist within, it is debatable whether a 'realist' position should ever be taken in psychological research (Joseph et al., 2009). Phenomenology focuses on the individual's experience of the world and proposes that language constructs, rather than describes, reality; that is, the words a person chooses to describe an experience construct a particular version of it (Willig, 2008).

Interpretative phenomenological analysis. Interpretative phenomenological analysis (IPA; Smith et al., 2009) explores how participants make sense of their personal and social world, with an emphasis on understanding an

individual's subjective personal experience (Smith & Osborn, 2003). IPA is particularly useful for exploring the meanings that major life experiences hold for participants, and is well suited to studying small research populations in depth, providing a good 'fit' between this study's research questions and design. Whilst exploring participants' sense-making, the researcher tries to make sense of the participant trying to make sense of their lived experience, referred to as a 'double hermeneutic', making IPA an interpretive process (Smith & Osborn, 2003). IPA is idiographic, as it is concerned with the 'particular' (Smith et al., 2009) and aims to capture in detail the quality of individual experiences (Willig, 2008). It is inductive as it allows themes to emerge from the data (Smith et al., 2009).

Participants

Qualitative studies using IPA require smaller sample sizes than other methodologies, enabling a richer depth of analysis (Smith et al., 2009). Other IPA studies in similar areas have used between three and eleven participants (e.g. Barone-Chapman, 2007; Johnson, Burrows, & Williamson, 2004). In this study, a purposive sample of eight participants who had successfully conceived via IVF or ICSI within the last two years took part. Exclusion criteria included being over 40 years of age and/or having had more than three cycles of IVF, the maximum number of cycles recommended for this age group (NICE, 2013). Participants were aged 24 to 39 and drawn from various locations in England. Table 2 outlines participant demographics. All identifying information has been changed to ensure anonymity.

Table 2. *Demographic details of participants.*

Pseudonym	Age	Ethnicity	Stage of pregnancy	Age of other children resulting
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				from IVF treatment
Alexandra	34	White British	4 weeks	15 months
Alice	29	White British	36 weeks	n/a
Ella	30	White British	n/a	4 months
Emily	33	White British	n/a	19 months
Kim	39	White British	n/a	21 months; 4 years 1 month
Paige	37	White African	35 weeks	2 years 2 months
Rebecca	39	White British	n/a	8 months
Victoria	24	White British	n/a	5 months

Procedure

The study was advertised through social media to reach a wide audience. A link directed potential participants to a website (Appendix F) with study details and a contact email address. Women who expressed their interest were emailed a full information sheet (Appendix G) outlining the purpose of the research, what it would involve, and confidentiality. They were encouraged to contact the researcher about any queries they had. Women who still wished to take part were offered a choice of interview location and date. One wished to be interviewed via telephone; all others chose to be interviewed at home. Ethical information was discussed again prior to interview, and written consent was gained (Appendix H). Interviews were recorded and ranged between 36 and 70 minutes.

Interview. A semi-structured interview schedule was developed (Appendix I) to explore participants' experiences of infertility, PA, and decision-making during pregnancy. Feedback was sought from an acquaintance who had undergone IVF treatment, which was useful in developing the interview questions.

Steps of IPA analysis. Transcripts were read several times. Initial comments about the text were made at, but not limited to, the descriptive, linguistic, and conceptual levels (Smith et al., 2009). Initial notes for each transcript were coded into words or phrases which captured their content and represented the emerging themes (Appendices J-K). These were clustered to reflect subordinate themes, the titles of which were revised and reorganised to reflect the researcher's interpretation. Finally, subordinate themes were grouped into superordinate themes, reflecting participants' experiences of infertility and PA during pregnancy.

Quality assurance. In keeping with Yardley's (2000) quality assurance principles for qualitative data, measures were taken to ensure the 'trustworthiness' of the research. Credibility and dependability were demonstrated through the use of verbatim extracts from participants and by grounding interpretations in the data. In order to demonstrate coherence and transparency, an audit trail of codes and themes (Appendices J-L) was checked by a clinical psychologist and a chartered sport and exercise psychologist (Elliott, Fischer, & Rennie, 1999). A bracketing interview (Ahern, 1999) was undertaken to increase self-awareness and reflexivity about researcher assumptions which could influence the analysis (Appendix M). A reflexive research journal (Appendix N) was also used. Guidelines for implementing IPA (Smith et al., 2009) were followed and examples of good quality IPA studies were referred to (Smith, 2011) to increase rigour.

Ethics. Ethical approval was granted by the Department of Applied Psychology Ethics Panel, Canterbury Christ Church University (Appendix O). The

potentially distressing effect of discussing IVF treatment was considered, and every effort was made to provide detailed information about the research beforehand, to emphasise the voluntary nature of participation, and to remind participants they could terminate the interview at any time. Each interview was followed by a participant debriefing. The information sheet provided contact details of organisations participants could speak to if they were concerned about their psychological wellbeing. The BPS Code of Ethics and Conduct (2009) was followed throughout.

Results

Three superordinate and 10 subordinate themes were identified (Table 3), with superordinate themes representing broad aspects of shared experience. Each subordinate theme consisted of multiple emerging themes, which verbatim quotes were used to illustrate (Appendix L for further examples).

Table 3. *Overview of themes.*

Superordinate themes	Subordinate themes	Emerging themes	Number of participants
1. Navigating away from childlessness and towards motherhood	1.1 The stigma of infertility	Loss of the imagined future	4
		Sense of otherness	4
		Social exclusion and withdrawal	3
		Sense of failure	2
		Apportioning blame	5

	1.2 The	Significant investment	5
	pressure to	Limited opportunities to get pregnant	3
	deliver	The all-consuming nature of IVF	3
	1.3 Navigating	Riding out the waves	8
	the storm	Reaching out to those in the same boat	2
		Sheltering from expectations	3
	1.4 The body	Optimising the body for IVF	8
	as a vessel	The importance of rest and relaxation	5
		The uniqueness of an IVF pregnancy	3
		Protecting precious cargo	3
2. Negotiating	2.1 Staying	Expecting the worst	4
a safe	afloat	PA as a threat to pregnancy	6
passage		Getting to a 'safe stage'	5
	2.2 Knowing	The need to be active	5
	your body	Listening to your body	5
		Modifying PA to suit your needs	7
	2.3 Information	Lack of advice about PA	5
	as a help and	Benefitting from others' knowledge	
	hindrance	about PA	4
		Seeking certainty	4
3. Balancing	3.1 Soothing	Feeling successful	2
the challenges	the self through	Emotional wellbeing	3
of pregnancy	PA	Feeling healthy	5
with the needs		Socially unifying	5
of the self			

3.2 Limitations	Physically uncomfortable	5
on PA	Feeling restricted by changing body	3
	Tiredness	4
	Time	2
3.3 PA as a	Controls weight gain	3
way to control	Helps birth	7
the experience	Eases aches and pains	5
of pregnancy	Perseverance	1
	Carrying on as normal	5

Superordinate Theme 1: Navigating Away from Childlessness and Towards Motherhood

This theme aimed to capture women's experiences of journeying away from childlessness and towards motherhood through the use of IVF. It conceptualises the journey towards motherhood as potentially treacherous, with various pressures to manage and emotional storms to navigate, but a preferable destination to a stigmatised, 'childless' identity. Participants responded to obstacles by using their bodies as a vessel to guide them through to motherhood.

Subordinate theme 1.1: The stigma of infertility. Infertility was experienced as stigmatising by all participants, seemingly capitulating them into 'childless' identity, where infertility became their defining characteristic. The loss of an imagined future as a mother led to a sense of otherness and social exclusion, taking participants closer to a 'childless' destination. For some, infertility appeared to

be experienced as traumatic. Responses included assigning failure and blame, potentially as a way to seek control in a seemingly uncontrollable situation.

The painful potential loss of an imagined future (i.e. having a family), was inferred through frequent pauses in speech. Kim spoke about how she saw it as her *'role in life...to have children'* and *'could not imagine a future without [them]'*, alluding to the importance of motherhood to her identity. Similarly, Alice referred to the *'unknown of what life would look like'* if she was unable to conceive. Even for women (like Kim) who had successfully given birth, there was an underlying threat of being recapitulated back into a 'childless' identity if IVF treatment did not succeed. Paige described the fragility of her identity as a mother, worrying that others would mistake her for a *'sad, childless woman'* when her daughter was not with her. This 'thin' childless identity seemed connected to experiences of otherness that four participants described – that infertility made them distinctly different to other women. Ella explained *'I always knew that I was going to have problems'* and Kim spoke about how she felt she was *'not like all those other people'* who *'get pregnant straight away'*. This sense of otherness was experienced even in two cases of medically unexplained infertility, suggesting it was related less to a woman's actual reproductive capabilities and more about the way in which they were perceived by others.

Participants experienced infertility as socially excluding and stigmatising as they were unable to conform to the dominant cultural norm of having children. This further reinforced a sense of otherness and led to social withdrawal for some, including Victoria who said she *'didn't really want to socialise'* with other people who had children. Alice too voiced a concern about how infertility would impact her

existing social network, as most already had children. This experience was shared by her partner:

'Realistically would we be able to stay friends with these people for the rest of our lives?'

Infertility was experienced as a failure either personally or as a couple, leading to questions of blame and who was 'at fault' for the resulting loss of the imagined future. Kim and Emily experienced infertility as a personal failure, with emphasis on the use of 'I' when speaking about their experiences. Emily stated '*I just couldn't conceive*' whilst Kim stated '*I'm not able to provide a child for [my husband]*'. In both cases, personal failure seemed to contrast a preferred identity as a mother and provider, despite there being no medical explanation for infertility in Kim's case. In contrast, Paige (who had been told both she and her husband had medical factors which contributed towards infertility) experienced infertility as a joint failure:

'A sense of failure that they all managed to do something that just for some reason, we just don't manage to do...'

For some there was an automatic assumption of blame by the medical community as '*all the (um) medical research always looks at the woman first*' (Rebecca). Ella described a similar experience:

'Because I have polycystic ovaries, they assumed maybe I wasn't ovulating but in fact I was.'

Experiences of failure and blame seemed connected to ideas of control in relation to trauma, with attempts to locate infertility in one partner or another as a way to determine the cause of the problem and thus find a way to fix it. Kim's view that '*as a woman, you take [the blame] all on anyway*' illustrates this attempt to regain

control. This view was not shared by all participants, and Paige described a sense of shared blame between her and her husband, reporting it was *'helpful that we each had an issue'*.

Subordinate theme 1.2: The pressure to deliver. All participants experienced the pressure to achieve a viable pregnancy through IVF and carry a baby to term which would allow them to forge a new identity as a mother. If they did not succeed, they would likely be recapitulated back into the stigmatised identity of a 'childless woman'. As a result, IVF treatment was experienced as all-consuming by some.

Five women spoke about IVF as a significant investment. On one level this related to the financial commitment that IVF required:

'...it's a lot of money; it's like thousands.' (Victoria)

On another level, and for majority of participants, the investment in their future identity was experienced as an emotional one:

'...there's not only the pressure of you wanting a child, it's also the fact that you don't want to go through all that process again. (Um)

Quite stressful.' (Emily)

IVF was also experienced as a significant physical undertaking. Paige described how her *'ovaries became really enlarged; they'd become absolutely massive; I was so uncomfortable'*. For some, knowing IVF was such a significant investment led to worries about whether it would be successful:

'...although there's nothing wrong with my egg count or anything, will it work?' (Victoria)

'Will it work?' was a worry shared by the majority of participants and seemed connected to experiences of having limited opportunities to get pregnant. This increased the pressure for IVF to work first time. Alexandra saw her age and financial resources as limiting opportunities to conceive, as was the case for some other participants:

'If I lose this one that I've got now, it won't be... I don't know if I'd ever conceive again.' (Alexandra)

For some, this exacerbated the lack of control they were already experiencing in relation to their ability to conceive. Ella had no previous children and was solely relying on the one NHS-funded IVF cycle her borough provided to succeed:

'It totally depends on the borough and how much money they've got. And in [deleted] it's one, which is... you kind of go ohhh, shit.'

Three women experienced IVF as '*all-consuming*' (Rebecca), in response to the significant investment and limited opportunities they faced to become pregnant. This was particularly salient for women who had no prior children, potentially as they had more to lose from a failed IVF cycle (as this would 'thicken' a childless identity), in contrast to participants who were already mothers. Paige and Alexandra, who both had one child from IVF treatment and were both pregnant with their second, made the distinction between their first and second IVF treatments. Paige described having '*nothing else to focus on*' for the first which meant it became '*completely ... consuming*', whereas Alexandra felt more '*relaxed*' about her second IVF experience, explaining '*I've got [my daughter] now*'.

Subordinate theme 1.3: Navigating the storm. This theme conceptualises the emotional experience of IVF as a storm, within which participants navigated their

journey towards motherhood. Emotions were experienced as a churning sea, with participants managing the waves in different ways. Some decided to 'ride it out'. Others chose to seek shelter from other peoples' expectations in order to protect themselves and their partners from the waves. Another way to relieve emotions was to reach out to others in the same boat.

All participants experienced emotional turmoil whilst undergoing IVF. A range of emotions was described by Kim, who said she was '*...everything from super emotional to really angry*'. Emily and Alice both experienced IVF as '*stressful*', and Victoria experienced it as '*scary*'. Different ways of responding to waves of emotion were employed. Whilst Rebecca '*got on with it*', seemingly attempting not to engage with the emotional aspect of the process, Paige took a more mindful approach:

'Feelings are feelings, they're not right or wrong, they just happen...'

As a woman in a more secure position of motherhood (eight months pregnant with her second child), Paige may have found it easier to 'ride out the waves', noticing emotions but not becoming overly distressed by them. Other participants who were first-time mothers, like Rebecca, did not seem to find this as easy to do.

Some participants took shelter from their friends and families' expectations, maintaining a degree of secrecy around the IVF process as a way to navigate the emotional storm. Ella saw this as a way to protect herself and her husband, thus avoiding exposure and having to cope with emotional turmoil in public:

'...only tell immediate family and friends and then if it hasn't worked, we can then be open and honest again, once we've kind of healed a bit.'

Rebecca described sheltering from other people's expectations as '*crucial*' because the chances of success were '*pretty low*'; however, she also experienced not speaking to anyone as '*one of the hardest things*'. For Kim, reaching out to other people in a more anonymous way - through internet forums - provided an opportunity to connect with others in the same boat whilst still protecting herself and her partner. This seemed to be experienced as helpful in navigating emotional storms:

'That support was amazing. They were the only people that understood.'

Subordinate theme 1.4: The body as a vessel. This theme conceptualises the body as a vessel which was used to navigate the way through IVF-related emotional storms and pressure to deliver. Alice's comment that her body was a '*little incubator*' illustrated this vividly. A vessel provides an optimal space to store and protect precious cargo during storms. For some, the body was experienced as separate to the self, used for the purpose of creating new life rather than serving ones' own needs.

All participants physically optimised their bodies for IVF to increase their chances of conceiving. Rebecca spoke about having a '*good, healthy diet*' and '*popping [vitamin] pills*' whilst Ella's experience of preparing her body seemed to verge on existential:

'Very, very pure; holier than thou.'

For some, engaging in PA was an integral way to optimise their body for IVF treatment. Victoria, whose first cycle of IVF failed, spoke of wanting to '*lose a little bit of weight*' and '*be healthy*' for her second cycle, implying that for her, PA was experienced as an important part of the conception process. This was also true for

Paige, who spoke about the importance of PA in making her body *'fitter and stronger'* as a way to withstand the physical demands of IVF treatment.

For the majority of participants, rest and relaxation were experienced as ways to let the body *'do what it needs to do'* (Rebecca), increasing the chances of conception. Alice explained, *'rest as much as you can'* during IVF because *'your body needs to create the eggs'*. It appeared that for many participants, optimising the body was experienced as a way to exert some control in what was, on the whole, an uncontrollable situation. Conversely, there was a sense that rest and relaxation provided a chance to relinquish some control and let natural processes take over, having already made sure *'your body's got everything it needs'* (Rebecca) to sustain a pregnancy.

Three women experienced their pregnancies (once confirmed) as unique in comparison to a spontaneously occurring pregnancy. For Emily, uniqueness related to having tried to get pregnant *'for so long'*, whilst for Rebecca it was related to a hyper-awareness of the conception process:

'You know the moment the embryos have been put back in that you're potentially pregnant.'

For Alexandra, who was in the very early stages of pregnancy with her second child, the uniqueness of pregnancy was also connected to a need to protect it:

'I'm so much more cautious because it's an IVF pregnancy, because I can't just conceive.'

Other participants also experienced their bodies as providing protection for their new pregnancies. Kim spoke about harbouring *'precious life'*, unwilling to do anything out of the ordinary in order to protect the baby. There was a sense that participants' own

needs were sacrificed in order to protect their precious cargo, with Emily prioritising *'doing the best for [the baby]...rather than doing the best for me.'*

The experience of an IVF pregnancy as unique and in need of a greater level of protection was not shared by all participants. Paige talked about the comparability with any other pregnancy:

'Once I'd got pregnant I always tried to put it similar to anybody else that's just got pregnant.'

Paige was already in a relatively 'safe' position, which is likely to have influenced her experiences compared to other participants, most of whom had one child and were contemplating going through the IVF process again in the future.

Superordinate Theme 2: Negotiating a Safe Passage

This theme captured the ways in which women negotiated their journey to motherhood once pregnant and particularly focuses on the decision-making process around safety and PA. One way to stay afloat was to know your body. Another was to use information to guide the decision-making process. Information was experienced as both a help and a hindrance.

Subordinate theme 2.1: Staying afloat. This theme speaks to managing perceived threats to pregnancy. These were experienced as constant by some participants given their preceding IVF journey. PA was experienced by the majority of participants as a threat to pregnancy, particularly in the early stages, which affected PA behaviour. Many responded by to this threat by getting to a 'safe stage' before considering engaging in PA in an effort to keep the 'vessel' afloat.

Some participants experienced staying afloat as difficult to do at times due to a perpetual expectation that 'the worst' would happen. Emily in particular voiced

concerns about the safety of her baby and feeling *'worried that I'd lose it'*. This perceived threat seemed connected with prior experiences of something 'going wrong' when trying to conceive naturally:

'You think well, oh yeah, once I get pregnant with IVF, that's it, I'll be happy. But you're not until the baby's here; you're not.' (Victoria)

PA was experienced as a threat to pregnancy by nearly all participants, which affected PA behaviour. For most, this was in the early stages of pregnancy; for a few, this continued until birth:

'I barely did any sort of exercise during the pregnancy because I was scared of something happening and me losing it.' (Emily)

Rebecca's job as a fitness instructor indicated that she valued PA; however, even she was *'terrified of just walking down the road'* during the first two months of pregnancy. Kim experienced *'a worry if you're jumping around a bit too much. Kind of a bit of a worry about damage'* to the baby, which prevented her from engaging in PA. This view was not shared by Paige, who reported no concern about losing her baby through PA at any stage of pregnancy and *'didn't take that viewpoint.'* Again, Paige's position as someone who had nearly completed her second pregnancy is likely to have influenced this response, compared to other participants who were first-time mothers.

Many participants responded to the perceived threat of PA by getting to a 'safe' stage in their pregnancy in order to actively engage in it and stay afloat. Alexandra spoke of the importance of her current pregnancy being more *'established'* before engaging in PA. For most, this ranged between two and twenty weeks:

'As soon as I was twelve weeks, I started exercising again.' (Ella)

For Paige, there was a sense that getting to the *'pregnancy point'* allowed her to confidently engage in PA whilst distancing herself from the experiences of infertility and sense of otherness:

'Now, I'm just like everybody else again. I can carry on.'

Subordinate theme 2.2: Knowing your body. This theme captures an internal process of re-connecting with the body after letting it *'do what it needs to do'* (Rebecca) to achieve a pregnancy. It links with the previous subtheme as knowing your body provides one way to stay afloat. The process of listening to the body is shaped by ideas about the safety of PA and risk to the baby.

The majority of participants experienced an internal *'need to be active'* (Rebecca) once they had arrived at a 'safe stage' of pregnancy. Alice described how she felt her body was ready to *'get moving'* whilst Ella found herself *'itching'* to exercise. In some cases, the need to be active seemed connected to a sense of self – to an identity of someone who had previously valued PA - as in Paige's case:

'If I didn't do some type of exercise, I didn't feel like me.'

Most participants who experienced a need to be active responded by listening to their body to stay safe during PA. Alice kept *'monitoring as [she] went along'*, and Victoria would *'listen to [her] body'* to know when she needed to *'calm down and have a rest'* in order not to put herself or her baby at risk.

Modifying PA was experienced as a way to satiate a need to be active whilst also listening to the body. Alice described needing to *'find another way of keeping my body moving without getting so knackered'*, whilst Rebecca engaged in PA *'most days, but my walks would be much more reduced'*. This experience was not shared by all participants. For Kim, listening to her body resulted in concern about *'exerting*

myself and she experienced *'reserving my energy for making a baby'* as preferable to engaging in PA.

'Knowing the body' seemed to be related to a process of rebuilding trust in the body's capabilities (e.g. to communicate its needs) after an experience of infertility, where it was experienced as having failed.

Subordinate theme 2.3: Information as a help and hindrance. This subtheme reflects a huge variance in how information about PA during pregnancy (particularly in the early stages) was experienced by participants; for some it was useful, informative, and gave confidence to engage in PA, for others it was experienced as confusing or non-existent.

Five women experienced a lack of, or unclear, information from health professionals about PA:

'I don't think I had any advice from the medical professionals about exercise or not.' (Kim)

Kim later added *'...because I'm not overweight. I don't think it ever came up'*, suggesting that for her, PA had a specific meaning related to weight control. The lack of information experienced by some women led to a sense of uncertainty regarding PA:

'I'm uncertain of what I can do.' (Alexandra)

Emily received specific information about rest around the time of embryo transfer but then seemed to be unsure about what she was *'allowed'* to do after this time, as evidenced by her emphasis on the word 'think':

'Two weeks after embryo transfer...I think you're allowed to you know, do as much exercise as possible.' (Emily)

This was not the case for all. Ella reported receiving '*wads of information booklets*' about PA throughout pregnancy, and seemed to experience this as positive because they were '*thorough (um) and everything was explained*'.

Some participants had benefitted from the knowledge of friends and extended support networks with regard to information about PA. Rebecca found her '*acupuncturist (um) really helpful actually, and one of my mates that was going through the same thing.*' However, Victoria, who described the pregnancy internet forum she joined as '*really good*', also experienced PA advice as contradictory, with forum-users advising her to '*rest up*' whilst '*some people would be just like, "oh like normal"*'.

Some participants sought specific PA information during pregnancy – particularly the first-time mothers who had no prior experience to draw on. Prior experiences of uncertainty (e.g. during IVF treatment) may have encouraged participants to seek certainty about PA during pregnancy as a way to regain a sense of control and keep the baby safe. For Alice, a first-time mother, specific guidance about PA seemed to be experienced as containing:

'I think I work quite well with structure' (Alice)

Ella acknowledged that whilst having access to specific information was useful for her because she was not '*left wondering*', it may not suit everyone:

'I think it might've put some people off but I really wanted to know'

This was the case for Paige, who was '*happy to go with whatever feels okay*' – something she may have learned from her previous pregnancy.

Superordinate Theme 3: Balancing the Challenges of Pregnancy with the Needs of the Self.

This theme conceptualises pregnancy as a time when boundaries between the self and the baby can become blurred. It explores the ways in which participants met their own physical and psychological needs whilst also balancing the physical challenges of pregnancy. PA provided one way to do this, and was experienced as a way to sooth the self and control the experience of pregnancy; however, the ability to engage in PA was often restricted due to physical limitations.

Subordinate theme 3.1: Soothing the self through PA. Nearly all participants reported psychological and physical benefits associated with PA during pregnancy. These were often experienced as reparative in the context of participants' previous traumatic experiences of infertility and associated stigma.

For two participants, PA facilitated a feeling of success. Rebecca felt she had '*achieved something*' after PA, whilst for Paige it appeared to be linked to a sense of validation that she (and her body) were still valued despite the experience of infertility:

'It feels good to therefore have something else that you are doing well in.'

PA provided a sense of '*emotional wellbeing*' (Paige) during pregnancy. Victoria found that going for a walk enabled her to '*take [her] mind off things*', including worry about the baby, which allowed her to '*...feel a bit better and to relax*'. Similarly, Rebecca experienced PA as facilitating '*peace of mind*'.

The majority of participants experienced PA as healthy for themselves and their babies. Paige alluded to the way in which PA made her '*feel better*' because she felt she was providing for her baby and ensuring its health by '*getting nice oxygen in the blood and that's good*'. Alexandra hoped that PA would '*be able to*

keep [my blood pressure] down'. For Ella, who developed gestational diabetes during pregnancy, PA was central to meeting both her and her baby's needs:

'It's very clear cut, you exercise, the baby's going to be healthier, you're going to be healthier.'

By staying healthy for themselves and their babies, participants seemed to be using PA to fulfil their new identity and role as a mother.

PA was also experienced as socially unifying during pregnancy by a number of participants. It provided opportunities to connect with other mothers:

'...little pregnancy things, it's nice to be able to say to someone else, 'Have you had that?'' (Alice)

It also meant connecting with partners and family:

'...me and my husband would go on walks' (Victoria).

The experience of PA as socially unifying is important when taken in context of previous experiences of infertility, where many participants described a sense of 'otherness' or feeling socially excluded. Alexandra found that hearing other people's pregnancy experiences in her antenatal yoga class made her realise *'you know, I'm normally pregnant now'*, suggesting PA had a reparative function in some cases for women who had previously felt stigmatised. The experience of the body 'feeling healthy' also contrasts previous experiences of being unable to naturally reproduce and the sense of failure that accompanied this.

Subordinate theme 3.2: Limitations on PA. Pregnancy mediated the amount of PA participants engaged in. For many, even day-to-day activities became physically challenging, and pregnancy interfered with the ability to soothe the self through PA.

The majority of participants experienced pregnancy as *'uncomfortable, physically'* (Ella), particularly during the last trimester. Due to the constraints of a changing body, being active during pregnancy was experienced as *'painful'* for Rebecca. Alice, who had gone for a run every day prior to pregnancy, found that her body restricted her ability to do the activities she enjoyed:

'I just want to go for a run and then like eat a whole brie (laughs). Just do all the things I can't do.'

Four participants also experienced pregnancy as tiring, which limited PA:

'...that stopped me, like because you get tired going up and down stairs' (Victoria)

Others talked about the time involved as a barrier, and Alexandra noted different experiences of PA during her current pregnancy compared to her first, because she was no longer working:

'...I mean, it's a lot easier for me to do it now because I'm not working'.

Subordinate theme 3.3: PA as a way to control the experience of pregnancy. This theme speaks to the way in which PA was used to manage the experience of pregnancy and how this was achieved. On one level, PA was used to control physical pregnancy experiences such as labour and weight gain; on another level it provided a sense of psychological control which had been diminished through their experiences of infertility, IVF treatment, and pregnancy. Kim spoke of how, during pregnancy, it was important it was to *'take control of the things you can control because there's so much you can't'*. Control was achieved through perseverance and holding on to 'normal' PA routines where possible.

PA was experienced as useful in controlling weight gain for some participants. Whilst Emily wanted to be a mother she '*didn't want to be big*' and used PA to control her changing body. This relates to weight gain but perhaps also to a changing or confused sense of identity – wanting to be pregnant (i.e. moving towards motherhood) but also wanting to '*stay slim*' (holding on to aspects of her old life). PA appeared to allow Emily an opportunity to control how quickly she moved towards a new identity as a mother.

All but one participant experienced PA as helpful or likely to help during childbirth, thus providing some personal control during a process in which the body's natural processes are usually seen to take over. Alexandra's stated '*you need to be physically fit to give birth*', whilst Paige likened the experience to '*training for a marathon*'. However, this experience did not appear to be shared by Kim:

'I don't know about if you're fitter then you have an easier birth. I don't know.'

As someone who had given birth to two children without any need for any medical intervention during birth, Kim may have had a different view regarding the importance of PA and its role in controlling the experience.

The majority of participants experienced PA as useful in controlling the aches and pains associated with pregnancy. Rebecca found that PA counteracted the '*pains that you get from sitting in stupid positions on the sofa because you can't get comfortable*', whilst Alexandra found it eased back pain:

'I suffered with my back a bit when I was pregnant. It helped, the stretching, we did a lot of stretching exercises.'

For many, engaging in PA proved challenging due to the physical limitations pregnancy placed on the body. Alice responded to this challenge by persevering with PA which, whilst challenging, may have allowed her to regain a sense of control during pregnancy, rather than letting the experience control her:

'I remember at one point feeling like it was a marathon run almost, like you just have to keep going' (Alice).

Many participants also spoke about the importance of 'carrying on as normal' with PA, again potentially as a way to increase their sense of control over the pregnancy experience. Alice commented that she *'never wanted to see pregnancy as an illness'* and *'wanted to continue as much as normal where it was safe to do so'*, suggesting that she saw pregnancy as a 'normal' part of her life which she could influence. Victoria also emphasised her commitment to 'carrying on as normal' with regard to PA, despite various obstacles:

'I thought "no, I'm just going to be normal, I'm going to do like my normal thing".'

Discussion

The three superordinate themes connect and increase our understanding of individuals' experiences of infertility and the decision-making process around PA during pregnancy, in line with the research questions.

Experiences of infertility – known to be stigmatising across cultures (Palha & Lourenço, 2011; Tabong & Adongo, 2013) and often traumatic (Paul et al., 2010) - were captured in the superordinate theme 'navigating away from childlessness and towards motherhood'. Some participants experienced infertility as a loss of an imagined future, echoing findings that such a trauma can be reinforced by the loss of hopes, dreams and social roles (Peoples & Rovner-Ferguson, 2000).

'Childlessness' seemed to become a defining self-characteristic, supporting White's (2004) theory that trauma can shrink a person's identity, leading to a 'thin', problem-saturated description of themselves. Infertility can also 'spoil' a person's identity (Goffman, 1963) and lead to stigmatisation, in line with participant experiences of otherness, social exclusion and withdrawal. Responses to infertility included assigning failure and blame, connecting with previous research (Imeson & McMurray, 1996). This was the case even in medically unexplained cases, confirming that regardless of the cause of infertility, the woman becomes the focus of the problem (Loftus & Namaste, 2011).

Conceiving and delivering a healthy baby provided a way to leave a 'childless' identity and associated stigma behind. IVF required a significant emotional, financial, and physical investment in motherhood; however, this was compounded by the limited opportunities some participants faced to get pregnant. As a result the experience was all-consuming, although this did not seem to be the case for those who were already mothers.

IVF created emotional pressures for couples (Rockliff et al., 2014) throughout the journey to motherhood. Responses included 'riding out' emotions, sheltering from other people's expectations, and reaching out to others. For some, this included family and friends. For others, internet forums provided a way to connect with others in an anonymous way, highlighting the potential value of such resources for sharing experiences and information (Cousineau & Domar, 2007).

The physical investment of IVF saw participants optimising their bodies through diet and exercise which were seen to increase chances of conception. This suggested a move towards an internal locus of control - a psychological protective factor following trauma, also associated with healthy behaviour during IVF – at a time

when an external locus of control can dominate (Beaurepaire, Jones, Thiering, Saunders, & Tennant, 1994). Control was also relinquished at points, with rest and relaxation experienced as important in allowing the body to do what it needed to in order to achieve a pregnancy. For some, pregnancy was experienced as unique and to be protected at all costs given the significant investment involved, echoing Lupton's (2012) account of pregnant women as carriers of a 'precious fetus' rather than individuals with their own needs.

Once pregnant, 'negotiating a safe passage' was essential in ensuring safe arrival at motherhood. This included decision-making about PA. Perceived threats were underlined by an expectation that 'the worst' would happen. Women who have undergone fertility treatment are often worried about participating in PA (Hegaard et al., 2010), and PA was experienced by the majority of participants as a threat to pregnancy, particularly in the early stages, which seemed to reduce PA behaviour. This makes sense in the context of the TPB and decision-making, as personal attitude towards PA is often a strong determinant of behaviour in Western, individualistic cultures (Van Hooft & De Jong, 2009). Most participants responded to the perceived threat of PA by getting to a 'safe stage' before considering PA engagement, in an effort to keep the baby safe.

One way to manage threats to pregnancy was to know your body, thus providing a degree of PBC. Most participants experienced an internal need to be active once they had reached a 'safe' stage of pregnancy but had to balance this with safety concerns about PA. Listening to the body (Hanghøj, 2013) and modifying PA allowed participants to engage whilst facilitating a process of re-connecting with the body after IVF treatment, a time when women often 'detach' from their bodies in

order to cope with the emotional and physical demands (Benjamin & Ha'elyon, 2002).

Information seeking formed part of the PA decision-making process and was experienced as both helpful and unhelpful, depending on amount and clarity. Lack of information from health professionals led to uncertainty about what level of PA was safe during pregnancy, supporting previous research highlighting the need for clear and consistent advice from professionals (Gross & Bee, 2004). Lack of or confusing information could have negatively affected normative beliefs towards PA in the context of the TPB and means that participants who held pre-existing beliefs that PA was unsafe were unlikely to have had an opportunity to question them. First-time mothers tended to seek certainty through information, perhaps as they had no prior experience to draw on and pregnancy is characterised by uncertainty (Greil, 1991).

Decision-making about PA was also explored in the last superordinate theme, 'balancing the challenges of pregnancy with the needs of the self'. PA provided a helpful way to psychologically and physically soothe the self and seemed to be experienced as reparative following the trauma of infertility, perhaps enabling a 'thicker' identity focussed on skills and strengths to emerge (White, 2004). It engendered feelings of success and validation, emotional wellbeing, and physical health for mother and baby, supporting previous research (Da Costa et al., 2003; Nash, 2011). PA was also experienced as socially unifying – important as social support improves psychological wellbeing following infertility trauma (Paul et al., 2010).

Pregnancy, however, mediated the amount of PA participants engaged in and was experienced as physically uncomfortable at times. Feeling restricted by a changing body, tiredness, and time constraints also prevented PA engagement,

supporting previous research (Duncombe et al., 2009; Marquez et al., 2009; Symons Downs & Hausenblas, 2004). These limitations on PA may have negatively affected some participants' PBC beliefs, decreasing their likelihood to engage in PA.

PA was also used to control physical pregnancy experiences such as labour and weight gain (Rutkowska & Lepecka-Klusek, 2002). Its role controlling weight provided one way for women to maintain their pre-pregnancy identity at a time when women often struggle to balance the identities of the old and new body, role, and self (Chang, Kenney, & Chao, 2010; Nash, 2011). This seemed to be the case for one participant. PA also provided psychological control which was achieved through perseverance and trying to carry on as 'normal'. Exercise self-schemas (belief that one is an 'exerciser') seemed to be an important motivator for participants who had engaged in PA prior to pregnancy (Leiferman, Swibas, Koiness, Marshall, & Dunn, 2011) and increased self-efficacy to overcome PA barriers (Hinton & Olson, 2001).

Further Links with Theory

According to the TPB, personal attitude, normative beliefs, and PBC towards a behaviour determine a person's intention and subsequent likelihood to engage in PA (Hausenblas & Symons Downs, 2004). Findings suggest that positive attitudes towards PA (e.g. beliefs that PA improves emotional wellbeing and will help birth) and negative attitudes (e.g. beliefs that PA is a threat to pregnancy) formed part of the PA decision-making process. Similarly, experiences of greater PBC (e.g. modifying PA, listening to your body) are likely to have been considered against experiences of lower PBC (e.g. physically uncomfortable, tiredness). Normative beliefs were expressed least; however, it appeared that positive beliefs (e.g. benefitting from others' knowledge) were outweighed for a number of participants by

the negative (e.g. lack of or confusing advice about PA). A combination of these beliefs are likely to have affected participants' intention to exercise, and thus PA engagement.

Other theories may also be useful in understanding the findings. In line with the health beliefs model (Hochbaum, 1958), perceived benefits and barriers to PA influenced the PA decision-making process. Beliefs regarding the severity and seriousness of inactivity were cited less, illustrating the need for clearer information about this from health professionals. Highlighting the benefits (increasing the pros) and debunking beliefs about the risks of PA (decreasing the cons) may also help women move from the precontemplation stage towards 'action' (PA engagement) according to transtheoretical model of change (Prochaska & DiClemente, 1983).

Limitations

Homogeneity of the sample could have been improved. Participants were similar in terms of social class and ethnicity, but at different stages of motherhood. This affected individual experiences. Most gave retrospective accounts of their experiences; however, research has shown that women recall accurate pregnancy-related information up to 10 years after their child's birth (Liu, Tuvblad, Li, Raine, & Baker, 2013), minimising recall bias.

The sample consisted of volunteers thus risking self-selection bias (e.g. women who already valued PA). However, the research did encompass accounts from women who did not class themselves as 'exercisers'.

IPA is incapable of inferring causality (Willig, 2008). Whilst we cannot say that women's experiences of PA directly affected PA behaviour, IPA still provides a useful way of enhancing our knowledge about their lived experiences.

Practice Implications

Findings suggest that experiences of infertility and IVF are likely to have an impact on mood, sense of identity, and wellbeing. Clinical psychologists therefore have an important contribution with this population. Narrative therapy could help build a 'thicker' identity following the trauma of an infertility diagnosis (White, 2004), whilst increasing a woman's internal locus of control is likely to result in more adaptive coping strategies during IVF treatment. Excessive anxiety about 'the worst' happening is likely to impact on emotional wellbeing during pregnancy, and is associated with a higher incidence of post-natal depression (Heron, 2004), indicating the importance of intervention. It is also important that practitioners such as midwives are aware of the distressing effects of infertility and IVF treatment, and can refer for psychological interventions where appropriate. Clinical psychologists could have a role in providing consultation and training about this. Motivational interviewing training for midwives may also improve PA engagement.

Benefits of PA and risk perceptions need to be explicitly discussed by health professionals during IVF treatment and pregnancy. This could positively influence personal attitudes and PBC towards PA and improve health behaviours (Pringle, Drummond, McLafferty, & Hendry, 2011). The transtheoretical model of change (Prochaska & DiClemente, 1983) may provide a useful framework to determine women's readiness for PA engagement, with motivational interviewing aiding this process.

A group PA intervention may be beneficial for this population as it would encourage social unification through sharing knowledge and experiences of

pregnancy. This is likely to be normalising, reducing feelings of social exclusion and engendering a positive sense of self.

Future Research

This study has shown how experiences such as infertility and perceptions of risk may influence PA engagement. Further quantitative research using pregnancy anxiety scales (Levin, 1991) could explore whether PA increases or reduces anxiety in this population, given the variation in participants' PA engagement.

This study did not delineate between 'exercisers' and 'non-exercisers'. Pregnant women's self-efficacy in overcoming barriers to PA can affect PA behaviour (Cramp & Bray, 2009). PA experience seems an important variable. Future quantitative research could explore the difference in reported self-efficacy and anxiety levels between those who exercised pre-pregnancy and those who did not. Qualitative research could explore experiences of PA in each of these groups.

A facilitated group PA intervention could be evaluated according to its effect on psychological wellbeing, sense of social inclusion, and confidence to engage in PA.

Conclusion

Three superordinate themes indicated the processes adopted to navigate traumatic and stigmatising experiences of infertility, IVF treatment, and decision-making about PA during pregnancy. Decision-making incorporated experiences of PA as a way to soothe the self and control the experience of pregnancy but was mediated by concerns about safety and physical limitations on PA. Findings complement and extend existing research, provide clinical implications, and indicate areas for future research.

References

- Ahern, K. J. (1999). Ten tips for reflexive bracketing. *Qualitative Health Research, 9*, 407-411. doi:10.1177/104973239900900309
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211. doi: 10.1016/0749-5978(91)90020-T
- Barone-Chapman, M. (2007). The hunger to fill an empty space: An investigation of primordial affects and meaning-making in the drive to conceive through repeated use of ART. *Journal of Analytical Psychology, 52*, 479-501. doi:10.1111/j.1468-5922.2007.00678.x
- Beaurepaire, J., Jones, M., Thiering, P., Saunders, D., & Tennant, C. (1994). Psychosocial adjustment to infertility and its treatment: Male and female responses at different stages of IVF/ET treatment. *Journal of Psychosomatic Research, 38*, 229-240. doi: 10.1016/0022-3999(94)90118-X
- Benjamin, O., & Ha'elyon, H. (2002). Rewriting fertilization: Trust, pain, and exit points. *Women's Studies International Forum, 25*, 667-678. doi: 10.1016/S0277-5395(02)00350-3

- Boivin, J., Domar, A. D., Shapiro, D. B., Wischmann, T. H., Fauser, B. C. J. M., & Verhaak, C. (2012). Tackling burden in ART: An integrated approach for medical staff. *Human Reproduction*, *27*, 941-950. doi:10.1093/humrep/der467
- British Psychological Society. (2009). Code of Ethics and Conduct. Retrieved from http://www.bps.org.uk/system/files/documents/code_of_ethics_and_conduct.pdf
- Brown, W. J., & Trost, S. G. (2003). Life transitions and changing physical activity patterns in young women. *American Journal of Preventative Medicine*, *25*, 140-143. doi: 10.1016/S0749-3797(03)00119-3
- Chang, S., Kenney, N. J., & Chao, Y. Y. (2010). Transformation in self-identity amongst Taiwanese women in late pregnancy: A qualitative study. *International Journal of Nursing Studies*, *47*, 60-66. doi:10.1016/j.ijnurstu.2009.06.007
- Chiaffarino, F., Baldini, M. P., Scarduelli, S., Bommarito, F., Ambrosio, S., D'Orsi, C., ...Ragni, G. (2011). Prevalence and incidence of depressive and anxious symptoms in couples undergoing assisted reproductive treatment in an Italian infertility department. *European Journal of Obstetrics & Gynaecology and Reproductive Biology*, *158*, 235-241. doi: 10.1016/j.ejogrb.2011.04.032

Cioffi, J., Schmied, V., Dahlen, H., Mills, A., Thornton, C., Duff, M., . . . Kolt, G. S.

(2010). Physical activity in pregnancy: Women's perceptions, practices, and influencing factors. *Journal of Midwifery & Women's Health, 55*, 455-461.

doi:10.1016/j.jmwh.2009.12.003

Clapp, J. F. (1990). The course of labor after endurance exercise during pregnancy.

American Journal of Obstetrics and Gynecology, 163, 1799–1805. doi:

10.1016/0002-9378(90)90753-T

Clarke, P. E., & Gross, H. (2004). Women's behaviour, beliefs and information

sources about physical exercise in pregnancy. *Midwifery, 20*, 133-141. doi:

10.1016/j.midw.2003.11.003

Cousineau, T. M., & Domar, A. D. (2007). Psychological impact of infertility. *Best*

Practice & Research Clinical Obstetrics & Gynaecology, 21, 293-308. doi:

10.1016/j.bpobgyn.2006.12.003

Cramp, A. G., & Bray, S. R. (2009). A prospective examination of exercise and

barrier self-efficacy to engage in leisure-time physical activity during pregnancy.

Annals of Behavioral Medicine, 37, 325-334. doi:10.1007/s12160-009-9102-y

- Crone, D., & Guy, H. (2008). 'I know it is only exercise, but to me it is something that keeps me going': A qualitative approach to understanding mental health service users' experiences of sports therapy. *International Journal of Mental Health Nursing, 17*, 197-207. doi: 10.1111/j.1447-0349.2008.00529.x
- Da Costa, D., Rippen, N., Dritsa, M., & Ring, A. (2003). Self-reported leisure-time physical activity during pregnancy and relationship to psychological well-being. *Journal of Psychosomatic Obstetrics & Gynecology, 24*, 111-119. doi: 10.3109/01674820309042808
- Diamond, R., Kezur, D., Meyers, M., Scharf, C. N., & Weinschel, M. (1999). Couple therapy for infertility. New York, NY: Guilford Press.
- Domar, A. D., Conboy, L., Denardo-Roney, J., & Rooney, K. L. (2012). Lifestyle behaviors in women undergoing in vitro fertilization: A prospective study. *Fertility and Sterility, 97*, 697-701. doi:10.1016/j.fertnstert.2011.12.012
- Duncombe, D., Wertheim, E. H., Skouteris, H., Paxton, S. J., & Kelly, L. (2009). Factors related to exercise over the course of pregnancy including women's beliefs about the safety of exercise during pregnancy. *Midwifery, 25*, 430-438. doi:10.1016/j.midw.2007.03.002
- Elliott, R., Fischer, C. T., & Rennie, D. L. (1999). Evolving guidelines for publication of qualitative research studies in psychology and related fields. *British Journal of Clinical Psychology, 38*, 215-229. doi:10.1348/014466599162782

Evenson, K. R., Moos, M., Carrier, K., & Siega-Riz, A. M. (2009). Perceived barriers to physical activity among pregnant women. *Maternal and Child Health Journal, 13*, 364-375. doi:10.1007/s10995-008-0359-8

Ezmerli, N. M. (2000). Exercise in pregnancy. *Primary Care Update for Ob/Gyns, 7*, 260-265. doi: 10.1016/S1068-607X(00)00056-1

Gaston, A., Wilson, P. M., Mack, D. E., Elliot, S., & Prapavessis, H. (2013). Understanding physical activity behavior and cognitions in pregnant women: An application of self-determination theory. *Psychology of Sport and Exercise, 14*, 405-412. doi:10.1016/j.psychsport.2012.12.009

Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity*. Englewood Cliffs, NJ: Prentice-Hall.

Goodrich, K., Cregger, M., Wilcox, S., & Liu, J. (2013). A qualitative study of factors affecting pregnancy weight gain in African American women. *Maternal and Child Health Journal, 17*, 432-440. doi:10.1007/s10995-012-1011-1

Greil, A. L. (1991). *Not yet pregnant: Infertile couples in contemporary America*. New Brunswick, NJ: Rutgers University Press.

Gross, H., & Bee, P. E. (2004). Perceptions of effective advice in pregnancy – the case of activity. *Clinical Effectiveness in Nursing, 8*, 161-169.

doi:10.1016/j.cein.2005.03.002

Hanghøj, S. (2013). When it hurts I think: Now the baby dies. Risk perceptions of physical activity during pregnancy. *Women and Birth, 26*, 190-194.

doi:10.1016/j.wombi.2013.04.004

Hausenblas, H., Giacobbi, P., Cook, B., Rhodes, R., & Cruz, A. (2011). Prospective examination of pregnant and nonpregnant women's physical activity beliefs and behaviours. *Journal of Reproductive and Infant Psychology, 29*, 308-319.

doi:10.1080/02646838.2011.629993

Hausenblas, H. A., & Symons Downs, D. (2004). Prospective examination of the theory of planned behavior applied to exercise behavior during women's first trimester of pregnancy. *Journal of Reproductive and Infant Psychology, 22*, 199-

210. doi:10.1080/02646830410001723788

Hegaard, H. K., Kjaergaard, H., Damm, P. P., Petersson, K., & Dykes, A. (2010).

Experiences of physical activity during pregnancy in Danish nulliparous women with a physically active life before pregnancy: A qualitative study. *BMC*

Pregnancy and Childbirth, 10:33. doi:10.1186/1471-2393-10-33

Heron, J. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders, 80*, 65-73. doi: 10.1016/j.jad.2003.08.004

Hinton, P. S., & Olson, C. M. (2001). Postpartum exercise and food intake: The importance of behavior-specific self-efficacy. *Journal of the American Dietetic Association, 101*, 1430-1437. doi:10.1016/S0002-8223(01)00345-5

Hochbaum, G. M. (1958). *Public participation in medical screening programs: A socio-psychological study* (Public Health Service Publication No. 572). Washington, DC: U.S. Government Printing Office.

Human Fertilisation and Embryology Authority. (2014). *Fertility treatment in 2013: Trends and figures*. London: Author.

Imeson, M., & McMurray, A. (1996). Couples' experiences of infertility: A phenomenological study. *Journal of Advanced Nursing, 24*, 1014-1022. doi: 10.1111/j.1365-2648.1996.tb02938.x

Johnson, S., Burrows, A., & Williamson, I. (2004). 'Does my bump look big in this?' The meaning of bodily changes for first-time mothers-to-be. *Journal of Health Psychology, 9*, 361-374. doi:10.1177/1359105304042346

Johnson, K. M., & Fledderjohann, J. (2012). Revisiting “her” infertility: Medicalized embodiment, self-identification and distress. *Social Science & Medicine*, 75, 883-891. doi:10.1016/j.socscimed.2012.04.020

Joseph, S., Beer, C., Clarke, D., Forman, A., Pickersgill, M., Swift, J., & Tischler, V. (2009). Qualitative research into mental health: Reflections on epistemology. *Mental Health Review Journal*, 14, 1-23. doi:10.1108/13619322200900006

Jutel, A. (2009). Sociology of diagnosis: A preliminary review. *Sociology of Health & Illness*, 31, 278-299. doi: 10.1111/j.1467-9566.2008.01152.x

Knowles, A. M., Niven, A., & Fawcner, S. (2011). A qualitative examination of factors related to the decrease in physical activity behavior in adolescent girls during the transition from primary to secondary school. *Journal of Physical Activity & Health*, 8, 1084-1091.

Krans, E. E., & Chang, J. C. (2011). A will without a way: Barriers and facilitators to exercise during pregnancy of low-income, African American women. *Women & Health*, 51, 777-794. doi:10.1080/03630242.2011.633598

Küçük, M. (2012). Bed rest after embryo transfer: Is it harmful? *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 167, 123-126. doi: 10.1016/j.ejogrb.2012.11.017

- Leiferman, J., Swibas, T., Koiness, K., Marshall, J. A., & Dunn, A. L. (2011). My baby, my move: Examination of perceived barriers and motivating factors related to antenatal physical activity. *Journal of Midwifery & Women's Health*, 56(1), 33-40. doi:10.1111/j.1542-2011.2010.00004.x
- Leppanen, M., Aittasalo, M., Raitanen, J., Kinnunen, T. I., Kujala, U. M., & Luoto, R. (2014). Physical activity during pregnancy: Predictors of change, perceived support and barriers among women at increased risk of gestational diabetes. *Maternal and Child Health Journal*, 18, 2158-2166. doi:10.1007/s10995-014-1464-5
- Levin, J. S. (1991). The factor structure of the pregnancy anxiety scale. *Journal of Health and Social Behavior*, 32, 368-381. doi: 10.2307/2137104
- Liu, J., Tuvblad, C., Li, L., Raine, A., & Baker, L. A. (2013). Medical record validation of maternal recall of pregnancy and birth events from a twin cohort. *Twin Research and Human Genetics*. 16, 845-860. doi: 10.1017/thg.2013.31
- Loftus, J., & Namaste, P. (2011). Expectant mothers: Women's infertility and the potential identity of biological motherhood. *Qualitative Sociology Review*, 7, 36-54. Retrieved from http://www.qualitativesociologyreview.org/ENG/Volume18/QSR_7_1_Loftus_Namaste.pdf

- Lupton, D. (2012). 'Precious cargo': Foetal subjects, risk, and reproductive citizenship. *Critical Public Health, 22*, 329-340. doi: 10.1080/09581596.2012.657612
- Marquez, D. X., Bustamante, E. E., Bock, B. C., Markenson, G., Tovar, A., & Chasan-Taber, L. (2009). Perspectives of Latina and non-Latina white women on barriers and facilitators to exercise in pregnancy. *Women & Health, 49*, 505-521. doi:10.1080/03630240903427114
- Marquez-Sterling, S., Perry, A. C., Kaplan, T., Halberstein, R. A., & Signorile, J. F. (2000). Physical and psychological changes with vigorous exercise in sedentary primigravidae. *Medicine & Science in Sports & Exercise, 32*, 58-62. doi:10.1097/00005768-200001000-00010
- McMahon, C., Tennant, C., Ungerer, J., & Saunders, D. (1999). 'Don't count your chickens': A comparative study of the experience of pregnancy after IVF conception. *Journal of Reproductive and Infant Psychology, 17*, 345-356. doi: 10.1080/02646839908404600
- McMahon, C. A., Ungerer, J. A., Beaurepaire, J., Tennant, C., & Saunders, D. (1997). Anxiety during pregnancy and fetal attachment after in-vitro fertilization conception. *Human Reproduction, 12*(1), 176-182. doi: 10.1093/humrep/12.1.176

Mottola, M., & Campbell, M. (2003). Activity patterns during pregnancy. *Canadian Journal of Applied Physiology*, 28, 642–653. doi:10.1139/h03-049

Nash, M. (2011). “You don't train for a marathon sitting on the couch”: Performances of pregnancy ‘fitness’ and ‘good’ motherhood in Melbourne, Australia. *Women's Studies International Forum*, 34, 50-65. doi:10.1016/j.wsif.2010.10.004

NICE (2013). *Fertility: Assessment and treatment for people with fertility problems*. Retrieved from <http://www.nice.org.uk/CG156>

Palha, A. P., & Lourenço, M. F. (2011). Psychological and cross-cultural aspects of infertility and human sexuality. *Advances in Psychosomatic Medicine*, 31, 164-183. doi: 10.1159/000328922

Paul, M. S., Berger, R., Berlow, N., Rovner-Ferguson, H., Figlerski, L., Gardner, S., & Malave, A. F. (2010). Posttraumatic growth and social support in individuals with infertility. *Human Reproduction*, 25, 133-141. doi: 10.1093/humrep/dep367

Peoples, D., & Rovner-Ferguson, H. (2000). *Experiencing infertility*. New York: WW Norton & Company.

Pringle, J., Drummond, J., McLafferty, E., & Hendry, C. (2011). Interpretative phenomenological analysis: A discussion and critique. *Nurse Researcher*, 18, 20-24. doi: 10.7748/nr2011.04.18.3.20.c8459

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*, 390-395. doi: 10.1037/0022-006X.51.3.390

Reading, A. E., Chang, L. C., & Kerin, J. F. (1989). Psychological state and coping styles across an IVF treatment cycle. *Journal of Reproductive and Infant Psychology, 7*, 95-193. doi: 10.1080/02646838908403580

Rockliff, H. E., Lightman, S. L., Rhidian, E., Buchanan, H., Gordon, U., & Vedhara, K. (2014). A systematic review of psychosocial factors associated with emotional adjustment in in vitro fertilization patients. *Human Reproduction Update, 20*, 594-613. doi:10.1093/humupd/dmu010

Royal College of Obstetricians and Gynaecologists. (2006). *Exercise in pregnancy* (Statement No. 4). Retrieved from <https://www.rcog.org.uk/globalassets/documents/guidelines/statements/statement-no-4.pdf>

Rutkowska, E., & Lepecka-Klusek, C. (2002). The role of physical activity in preparing women for pregnancy and delivery in Poland. *Health Care for Women International, 23*, 919-923. doi: 10.1080/07399330290112416

Santos, P. C., Abreu, S., Moreira, C., Lopes, D., Santos, R., Alves, O., . . . Mota, J. (2014). Impact of compliance with different guidelines on physical activity during

pregnancy and perceived barriers to leisure physical activity. *Journal of Sports Sciences*, 32, 1398-1408. doi:10.1080/02640414.2014.893369

Smith, J. A. (2011). Evaluating the contribution of interpretative phenomenological analysis. *Health Psychology Review*, 5, 9-27.
doi:10.1080/17437199.2010.510659

Smith, J., Flowers, P., & Larkin, M. (2009) *Interpretive Phenomenological Analysis: Theory, Method and Research*. London: Sage.

Smith, J. A., & Osborn, M. (2003). Interpretative phenomenological analysis. In J. A. Smith (Ed.), *Qualitative Psychology: A Practical Guide to Research Methods* (pp. pp. 51-80). London: Sage.

Su, T., Chen, Y., Hung, Y., & Yang, Y. (2001). Comparative study of daily activities of pregnant and non-pregnant women after in vitro fertilization and embryo transfer. *Journal of the Formosan Medical Association*, 100(4), 262-268.

Symons Downs, D., & Hausenblas, H. A. (2003). Exercising for two: Examining pregnant women's second trimester exercise intention and behavior using the framework of the theory of planned behavior. *Women's Health Issues*, 13, 222-228. doi: 10.1016/j.whi.2003.09.004

Symons Downs, D., & Hausenblas, H. A. (2004). Women's exercise beliefs and behaviors during their pregnancy and postpartum. *Journal of Midwifery & Women's Health, 49*, 138-144. doi:10.1016/j.jmwh.2003.11.009

Tabong, P. T., & Adongo, P. B. (2013). Infertility and childlessness: A qualitative study of the experiences of infertile couples in Northern Ghana. *BMC Pregnancy & Childbirth, 13*:72. doi: 10.1186/1471-2393-13-72

Van Hooft, E. A. J., & De Jong, M. (2009). Predicting job seeking for temporary employment using the theory of planned behaviour: The moderating role of individualism and collectivism. *Journal of Occupational and Organizational Psychology, 82*, 295-316. doi: 10.1348/096317908X325322

Wallace, A. M., Boyer, D. B., Dan, A., & Holm, K. (1986). Aerobic exercise, maternal self-esteem, and physical discomforts during pregnancy. *Journal of Nurse-Midwifery, 31*, 255-262. doi:10.1016/0091-2182(86)90034-0

White, M. (2004). Working with people who are suffering the consequences of multiple trauma: A narrative perspective. *The International Journal of Narrative Therapy and Community Work, 1*, 45-76.

Willig, C. (2008). *Introducing qualitative research in psychology: Adventures in theory and method* (2nd ed.). Buckingham: Open University Press.

World Health Organisation. (2010). *Global recommendations on physical activity for health*. Retrieved from

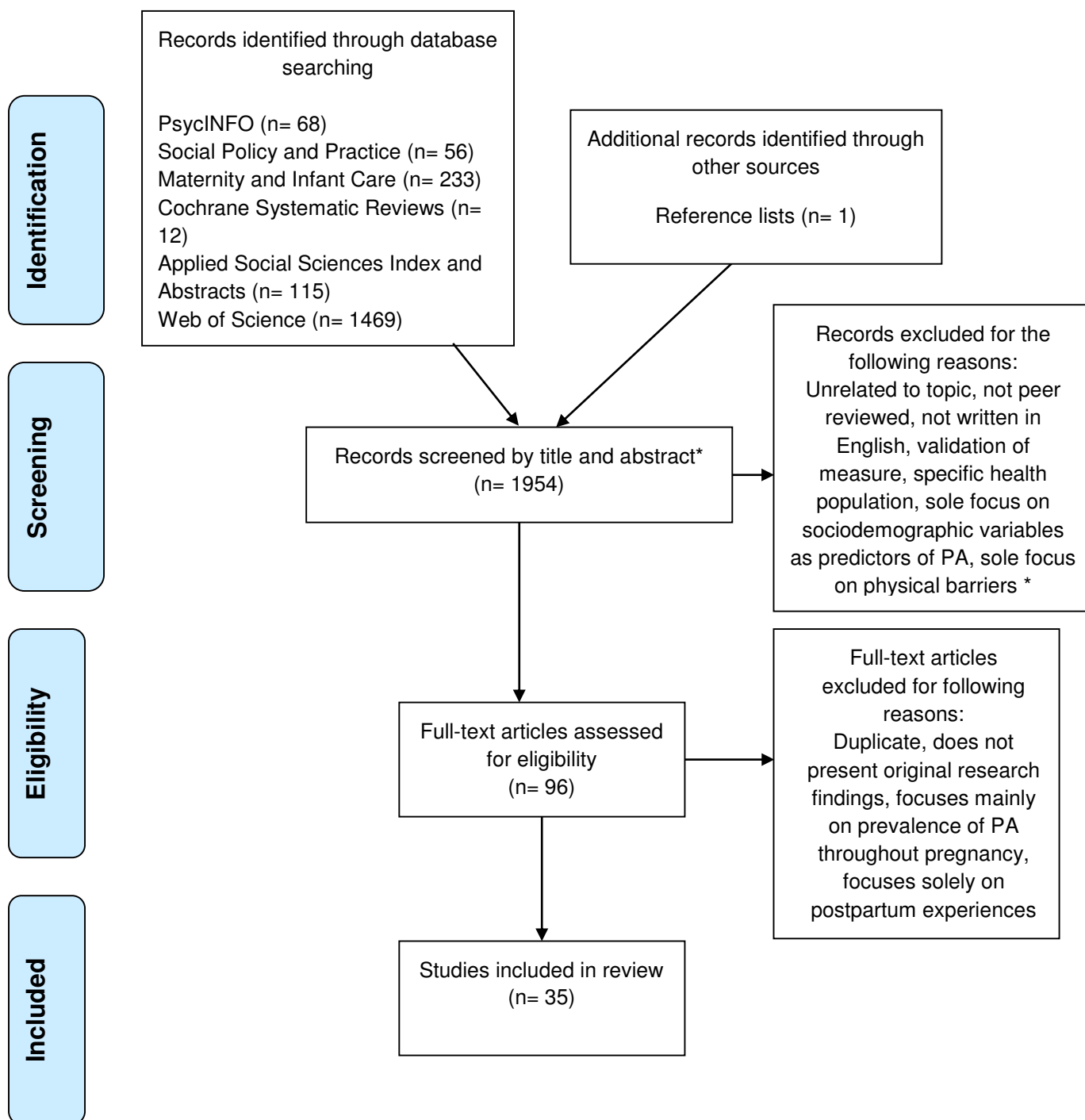
http://whqlibdoc.who.int/publications/2010/9789241599979_eng.pdf?ua=1

Yardley, L. (2000). Dilemmas in qualitative health research. *Psychology and Health*, 15, 215-228. doi:10.1080/08870440008400302

Section C: Appendix of Supporting Material

Appendix A: Literature Search Strategy

Figure 1. PRISMA flow diagram of the literature search process (adapted from Moher, Liberati, Tetzlaff, & Altman, 2009).



*Contains some duplicate records. Due to the large volume of database records returned from the initial search, duplicate screening at this stage was not possible.

Appendix B: *This has been removed from the electronic copy*

Appendix C: *This has been removed from electronic copy*

Appendix D: *This has been removed from the electronic copy*

Appendix E: *This has been removed from the electronic copy*

Appendix F: Participant Website (<https://cw4012.wordpress.com/author/cw4011/>)

Experiences of IVF, Physical Activity, and Pregnancy

Mothers and Mothers to Be! Are you currently pregnant, or have you given birth within the last two years? Did you conceive via IVF? If so I am keen to talk to you.

My name is Chloe Walker and I'm conducting research into womens' experiences of physical activity during a pregnancy resulting from IVF.

What is the purpose of the study?

The purpose of this study is to better understand the experiences of physical activity for women who have undergone successful IVF treatment with the hope of positively impacting health care and adding to previous research.

What will happen to me if I take part?

Study participation will involve attending a face to face or telephone interview with me for approximately one hour. There is no follow-up or further participation after this. Face to face interviews will be held at a location convenient for you as I am happy to travel to meet you.

Other Information

All information shared in the study will be kept anonymous.

This study has received ethical approval from Canterbury Christchurch University.

This research forms part of a doctoral qualification in clinical psychology awarded by Canterbury Christ Church University.

If you are interested in taking part or have any questions please:

– Email me at xxxxx@xxxxxxxxxx.xx.xx

-Tweet me [@xxxxxx](https://twitter.com/xxxxxx)

– Write to me at the address below:

Chloe Walker, Trainee Clinical Psychologist
Department of Applied Psychology, Runcie Court
David Salomons Estate
Broomhill Road
Tunbridge Wells
Kent, TN3 0TG

Many thanks for reading this advert and I very much look forward to hearing from you.

Appendix G: Participant Information Form

Experiences of physical activity in women who have undergone successful in vitro fertilisation treatment

My name is Chloe Walker and I am a Trainee Clinical Psychologist at Canterbury Christ Church University. I would like to invite you to take part in a research study. Before you decide whether to take part it is important that you understand why the research is being done and what it would involve for you.

What is the purpose of the study?

The purpose of this study is to better understand the experiences of physical activity for women who have undergone successful in vitro fertilisation treatment (IVF) with the hope of adding to previous research and increasing our knowledge about physical activity in this population.

Do I have to take part?

It is up to you to decide to join the study. If you agree to take part, I will then ask you to sign a consent form. You are free to withdraw at any time, without giving a reason.

What will happen to me if I take part?

Study participation will involve attending an interview with me for approximately one hour. There is no follow-up or further participation after this. I would like to record this interview so that I can use it for reference while proceeding with this study. I will not record the interview without your permission. If you do grant permission for our conversation to be recorded, you have the right to revoke recording permission and/or end the interview at any time.

Expenses and payments

Travel expenses (up to £10) can be reimbursed; however the research will be taking part at a local community venue, or at your home if this would be preferable, to avoid any lengthy or unnecessary travel for you.

What are the possible disadvantages and risks of taking part?

The possible disadvantages of taking part include:

- The time involved.
- For some individuals, discussing their experience of IVF may be a sensitive subject. However, you are under no obligation to answer any questions you do not wish to answer, and you may withdraw from the study at any time.

What are the possible benefits of taking part?

There is no intended benefit to taking part in the study; however, we hope that the information from this study will enable us better understand the experience of physical activity for women who have undergone successful IVF treatment as well as some of the challenges it may present. In the future, this could influence how health professionals work with and support women who have conceived through IVF.

What will happen if I don't want to carry on with the study?

You have the right to withdraw from the study at any point. If you decide to withdraw, your data will be extracted and destroyed.

What if there is a problem?

If there is a problem and you would like to raise this, please follow the complaints procedure outlined below.

Complaints

If you have a concern about any aspect of this study, please speak to me and I will do my best to answer your questions. I can be contacted by leaving a voicemail message on xxxx xxx xxxx. Please say that the message is for me, Chloe Walker, and leave a contact number so that I can get back to you. Alternatively, you can e-mail me at xxxxx@xxxxxxxxxx.xx.xx

If you remain unhappy and wish to complain formally, you can do this through the Canterbury Christchurch University complaints procedure. Details can be obtained from:

Professor Paul Camic, Research Director
Canterbury Christ Church University
David Salomons Estate
Broomhill Road
Tunbridge Wells
Kent, TN3 0TG
Tel: 0333 011 7070

Will my taking part in this study be kept confidential?

- Any information collected from you during the course of the research will be kept strictly confidential, apart from in the unlikely event of any information relating to risk of harm to yourself or others in which case I may need to liaise with other health professionals (e.g. your GP) to make sure you and your family were well supported and safe.
- All audio recording data will be stored securely on an encrypted and password protected memory stick.
- The data will only be used for the purpose of this study.
- Only authorised individuals directly involved in the research will have access to any identifiable data.
- The data will be retained for 10 years following the study completion, after which it will be disposed of securely.

What will happen to the results of the research study?

The results of the study will be written up and reviewed by examiners as part of my clinical psychology doctoral training. The results may also be submitted to a scientific journal for publication. You will not be personally identified in the report or publication, and any quotes from your interview will be anonymised.

If are interested in being e-mailed a summary of the findings of this study once completed, please let me know and I am happy to do this.

Who is organising and funding the research?

The research is being organised and funded by Canterbury Christ Church University.

Who has reviewed the study?

All research in Canterbury Christ Church University is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by the Canterbury Christ Church University Research Ethics Committee.

You will be given a copy of this information sheet and a signed consent form to keep for future reference.

Further information and contact details

- *Specific information about this research project, including advice as to whether you should participate:*

If you would like to speak to me and find out more about the study or have questions about it answered, you can leave a voicemail message for me on 0333 011 7070. Please say that the message is for Chloe Walker and leave a contact number so that I can get back to you.

- *Who to approach if you are unhappy with the study:*

Please contact me in the first instance either in person (during the study) or by telephone (see above contact details). Refer to the “*Complaints*” section for further advice if you would like to make a formal complaint.

- *Contacts if you are concerned about your psychological wellbeing*

If you have any concerns about your psychological wellbeing, please see your GP or contact NHS Direct for advice on 0845 46 46.

Appendix H: Participant Consent Form**Title: Experiences of physical activity in women who have undergone successful in vitro fertilisation treatment**

Name of Researcher: Chloe Walker

Please initial box

1. I confirm that I have read and understand the information sheet date for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without my legal rights being affected.	
3. I agree that anonymous quotes from my interview responses may be used in published reports of the study findings.	
4. I give permission for this interview to be recorded.	
5. I agree to take part in the above study.	

Name of Participant _____

Date _____

Signature _____

Name of Person taking consent _____

Date _____

Signature _____

If you would like to receive a summary of this study's results once the research has been completed please provide your email address below:

PLEASE TURN OVER & COMPLETE THE SECOND COPY OF THE CONSENT FORM

Appendix I: Interview Schedule

Demographic Questions

Before we begin I wondered if I could ask a few questions about you?

What is your age?

How would you describe your ethnicity?

How many weeks pregnant are you at the moment? (where applicable)

Who do you live at home with? Do you have any other children?

Warm up questions

How did you hear about the research?

What prompted you to get in touch?

I wondered if you could you tell me a bit about life before IVF?

IVF Process

Tell me about your experience of the IVF process

-When did you decide to start IVF?

-What did you feel about starting IVF?

-How many cycles of IVF did you undergo before conceiving?

-Was this the first time you'd undergone IVF?

-What did IVF mean to you?

-What has this pregnancy meant to you?

Tell me about the advice were you given (if any) about physical activity and exercise during the IVF process

-Did that advice change throughout your pregnancy?

-Who did you talk to?

-What did you feel about the advice you were given?

Tell me about your activity levels pre-pregnancy

-Did they change during IVF treatment and pregnancy? If so, what changed?

Pregnancy and Physical Activity

What influenced how much physical activity you took part in during your pregnancy?

-What ideas did you/do you have about physical activity during pregnancy? Where did these ideas come from?

-What did you feel about the idea of being active during pregnancy?

Can you tell me what, if anything, you valued about physical activity during pregnancy?

-Did this change as the pregnancy progressed?

-If no, were there other things you valued during pregnancy?

Tell me about what made you more or less likely to engage in physical activity during pregnancy

-What did you feel about these barriers/motivators?

-What did it mean to you that these things made it harder/easier for you to engage in physical activity?

-Tell me about how, if at all, you overcame any barriers to physical activity

Childbirth

Tell me about your experience of childbirth (where applicable)

-Were there any complications?

-What ideas did you/do you have about physical activity and labour?

-What do you expect it to be like?

General prompts: Tell me more?

Would you be willing to say a bit more about that?

Would you be able to expand on that for me?

Appendix J: *This has been removed from the electronic copy*

Appendix K: *This has been removed from the electronic copy*

Appendix L: Table of Further Examples of ThemesTable 4. *Further examples of each theme.*

Superordinate themes	Subordinate themes	Emerging themes	Example quotations
Navigating away from childlessness and towards motherhood	The stigma of infertility	Loss of the imagined future (Paige, Victoria, Kim, Ella)	<p>“I got with David’s dad, Edward, and (err) just assumed then that it would be kind of almost straightforward. You don’t then think you have to have any input because you think it’s a man and a woman; nice and easy [pause]...sadly not” (Ella)</p> <p>“This child isn’t there that you thought... would be...or your life isn’t what you thought it would be” (Paige)</p> <p>“You just go into life thinking that’s the normal route of things and that’s what you’re going to do one day. I can’t say I was more so than anybody else but I just thought I would get married and have a family and do as everybody else does” (Paige)</p>
		Sense of ‘other’ness (Victoria, Ella, Paige, Kim)	<p>“Maybe in my head, I had ideas about what it’s like being a woman that can’t have a child; this image of this childless woman you know. Maybe in my head I had ideas; I just didn’t want to be associated with it at all” (Paige)</p> <p>“You’re not like all those other people, you know your friends, your relatives that just stop taking their pill and get pregnant straight away” (Kim)</p>
		Social exclusion and withdrawal (Victoria, Alice, Paige)	<p>“I don’t know if I’d say depressed, but I was really down (um) so I didn’t really go out a lot, to be honest. I didn’t really want to</p>

		socialise with lots of people and stuff" (Victoria)
		"It's very difficult socially, when all your friends are moving on and having families, so you suddenly find that you've socially been excluded a little bit" (Paige)
	Sense of failure (Paige, Kim)	"...not being able to provide grandchildren for my parents; a child for Alex. You know, I've met this guy; I think he's going to make a brilliant dad; I'm not able to provide a child for him" (Kim)
		"...despite investigations, we still had no child and couldn't conceive naturally and didn't conceive at all, so I didn't even miscarry or anything. I just couldn't conceive" (Emily)
		"I felt a real sense of failure that they all seemed to just be all happy families and everybody doing it and everybody's out pushing a pram and I couldn't" (Paige)
	Apportioning blame (Paige, Rebecca, Kim, Emily, Ella)	"They're like, keep going, you'll be fine and just keep trying, keep trying. And then they're like, okay, it's a long time; let's check your other half out" (Rebecca)
		"I wonder what it would've been like if it was me to blame or him to blame; I wonder if that would've brought in extra (um) you know, factors into it but because it was a problem we both had, we probably felt about the same for it" (Paige)
The pressure to deliver	Significant investment (Paige, Victoria, Rebecca, Kim, Emily)	"So it becomes a project; it has to be because you're investing so much in it, emotionally, physically, and financially" (Kim)
		"Knowing that you're forking out an absolute shed-load of money, (um)

		we wanted to make sure that we did everything that we possibly could to give ourselves the best chance of success” (Rebecca)
	Limited opportunities to get pregnant (Rebecca, Alexandra, Ella)	“You’ve got that one chance in a month you know, all you get is your cycle every month, so you kind of try, try, try; no result and it’s like urgh, back to the drawing board” (Rebecca)
	The all-consuming nature of IVF (Paige, Rebecca, Alexandra)	<p>“It’s really intense. And it’s just very all-consuming and you can’t really tell anybody why you’ve kind of vanished off the planet for a couple of weeks” (Rebecca)</p> <p>“Literally, you’ve got everything riding on this; you know potential” (Kim)</p> <p>“It becomes really obsessive and only... I think only if you’ve been through IVF, will you appreciate (um) what it involves and what you put yourself through” (Rebecca)</p> <p>“It was all or nothing really because it was (um)... we didn’t know if we’d ever have a child” (Alexandra)</p>
Navigating the storm	Riding out the waves (Kim, Emily, Alexandra, Alice, Paige, Rebecca, Ella, Victoria)	<p>“In terms of emotional stress, it was really harsh when we found out [we needed IVF] and then (um) yeah, the process was really stressful” (Alice)</p> <p>“I mean, it’s just a bit of a cliché; it’s a massive rollercoaster but a lot of ups and a lot of downs caused by I suppose expectation and the drugs” (Kim)</p>
	Reaching out to those in the same boat (Kim, Victoria)	“The support network was virtual really; a bunch of people I still keep in contact with” (Kim)

		<p>“It was just scary really. What would I have to go through and that’s when I joined the forum; the IVF forum and started asking lots of questions and that was really helpful” (Victoria)</p>
	<p>Sheltering from expectations (Rebecca, Kim, Ella)</p>	<p>“One of the hardest things is that you don’t really tell anybody what you’re going through because of the chances of success being pretty low” (Rebecca)</p> <p>“I tell loads of people about it now but you know, we didn’t tell anyone at first” (Kim)</p> <p>“We decided that the month that we were doing it, we would only tell immediate family and friends because we didn’t want somebody to say, ‘Are you pregnant yet? Are you pregnant yet?’” (Ella)</p>
<p>The body as a vessel</p>	<p>Optimising the vessel</p>	<p>“They start popping pills like there’s nobody’s business, you know; vitamin C and your folic acid and everything” (Rebecca)</p> <p>“They say you have to be pre-pregnant” (Ella)</p> <p>“I thought the fitter and stronger I was, the more likely I was to get pregnant because you just have this perception of being healthy and da da da da da...” (Paige)</p> <p>“I lost a stone before I started IVF. And (um) so I was going to the gym loads” (Alexandra)</p>
	<p>The importance of rest and relaxation (Paige, Victoria, Rebecca, Kim, Alice)</p>	<p>“The general advice was rest, rest, rest” (Rebecca)</p> <p>“Let all the nutrients that are going through your body just grow these follicles into monsters” (Rebecca)</p>

			<p>“I remember reading when you’re going through the stimulant bit, go easy because your body needs to create the eggs so don’t overdo it, like try and rest as much as you can” (Alice)</p>
		<p>The uniqueness of an IVF pregnancy (Rebecca, Emily, Alexandra)</p>	<p>“Mine was very different to other people’s pregnancies because I tried for it for so long; (um) I think it certainly made a difference” (Emily)</p> <p>“I think I’m so much more cautious because it’s an IVF pregnancy, because I can’t just conceive” (Alexandra)</p> <p>“I think the difference between IVF possibly and (err) pregnancy through natural methods is that (um) when you’re trying, you’re trying and you kind of get on with real life. When you’re going through IVF, you’re having to take a step back and you know... you know the moment the embryos been put back in that you’re potentially pregnant” (Rebecca)</p>
		<p>Protecting precious cargo (Kim, Emily, Alice)</p>	<p>“But you know, I’ve got this precious life and I don’t want to start doing something” (Kim)</p> <p>“My main concern was the baby and doing the best for it and trying to think of that, rather than doing the best for me” (Emily)</p>
<p>Negotiating a safe passage</p>	<p>Staying afloat</p>	<p>Expecting the worst (Paige, Emily, Alexandra, Victoria)</p>	<p>“We’d been through so much to get her and so I was always expecting something to happen” (Alexandra)</p> <p>“We didn’t even believe we were going to have it until I had her in my arms, and I was holding her; that was when you realised you know, that I’d actually managed to get to the end of the pregnancy so that was literally how on edge we</p>

	<p>were through the entire pregnancy” (Emily)</p> <p>“Yeah, we didn't want to you know, believe anything until you know, she was there.. ” (Emily)</p> <p>“It seemed like all I was doing was getting by to the next time that I had a scan or heard the baby’s heartbeat or something” (Victoria)</p>
<p>PA as a threat to pregnancy (Paige, Victoria, Rebecca, Kim, Emily, Alexandra, Alice)</p>	<p>“I know some people go running and what have you, I just couldn’t believe they did it because it would be shaking up the baby inside” (Emily)</p> <p>“I was involved in a really quite strenuous (um) aerobics class. I can’t see myself doing that for a while, just because I’ll be worried. Even though probably, it’s probably quite a good thing” (Alexandra)</p>
<p>Getting to a ‘safe stage’ (Paige, Victoria, Emily, Alexandra, Ella)</p>	<p>“...probably after that point, I wasn’t so anxious that it might go wrong. I think it... if I’d got to eight weeks, I was quite happy that I’d go full-term” (Rebecca)</p> <p>“I will be going back to the gym and swimming, probably in a few weeks time when the pregnancy is more established” (Alexandra)</p> <p>“I kind of stuck by that [‘don’t do it’ mentality]... the first eight weeks, until I had the final scan with them” (Emily)</p> <p>“I think probably at eight weeks; eight weeks we went on holiday, we took a flight, we were swimming, going for long walks; that was probably when I started to relax” (Rebecca)</p> <p>“I think when I got past the twenty week scan, I began exercising more again” (Victoria)</p>

Knowing your body	The need to be active (Paige, Victoria, Alexandra, Ella, Alice, Rebecca)	<p>“I’m not very good with sitting and doing nothing, so I think that’s just part of it as well. I just needed to get moving” (Alice)</p> <p>“I couldn’t just sit around in the house all day, I can’t do that, I have to be active. And I’m not going to go and go to the shops or anything, I’d rather just be out, being active” (Rebecca)</p>
	Listening to your body (Paige, Victoria, Rebecca, Ella, Alice)	<p>“I’d keep on monitoring as I went along about how sweaty I was getting and how out of breath I was getting” (Alice)</p> <p>“I don’t know if when you’re a bit older, when you hit your thirties you have a bit more confidence in how it feels; how your body feels, how you’re coping, how you’re not coping” (Paige)</p> <p>“So yeah, I’d just listen to my body really” (Victoria)</p>
	Modifying PA to suit ones’ needs (Paige, Victoria, Rebecca, Emily, Alexandra, Ella, Alice)	<p>“It’s my own decision, yep, because my heart rate tends to really spike when I do [running] and I do... and it was partly because with the bleeding as well, and I thought I’ll go lower impact” (Alice)</p> <p>“Getting a little bit further into your pregnancy, you’re not quite so comfortable anyway so I didn’t do the running anymore but I did walk (um) forty minutes to work and forty minutes back every day” (Paige)</p>
Information as a help and hindrance	Lack of advice about PA (Paige, Victoria, Kim, Emily, Alexandra)	<p>“Nobody ever really said whether it would help or not” (Kim)</p> <p>“It should be better publicised or be made really clear as to how much exercise you should be doing because so many different people</p>

			have different versions of what you should be doing" (Emily)
		Benefitting from others' knowledge about PA (Victoria, Rebecca, Kim, Emily)	"And that [forum] was brilliant and from that, there was just loads of advice about what to do, what not to do, you know" (Kim)
		Seeking certainty (Victoria, Emily, Ella, Alice)	"I think some people would want to know exactly what they can do and they would want to know can I walk that ten minutes this morning or not? But for others, they are quite happy to just go with whatever they feel" (Paige)
			"...they weren't massively clear on. Does that make sense? So specifically in terms of exercise (Alice)
Balancing the challenges of pregnancy with the needs of the self	Soothing the self through PA	Feeling successful (Paige, Rebecca)	"It was definitely having achieved something despite feeling like you couldn't get off the sofa all day" (Rebecca)
		Emotional wellbeing (Paige, Rebecca, Alice)	"So for me, other than the physical, I see it as very important for emotional well-being to do exercise" (Paige)
			"Just seeing the big outdoors, you know, that was just really important for your own peace of mind, isn't it" (Rebecca)
			"[PA] was trying to focus on something else other than baby, baby, baby, baby because that's all that was in my head, twenty-four seven. Is the baby okay? Has it moved today? Is it kicking?"(Victoria)
		Feeling healthy (Paige, Victoria, Rebecca, Kim, Alexandra, Ella)	"In my head, I had this association of being healthy, being good for me, being good for the baby. So I'd feel like a nice walk, the baby's getting nice oxygen in the blood and that's good, so it made me feel better" (Paige)

		<p>"I'd heard somebody say somewhere about oxygen to the baby" (Emily)</p> <p>"Hopefully, with exercise, this time round, I'll be able to keep [my blood pressure] down" (Alexandra)</p> <p>"I think yeah, I'm sure physical activity and exercise is a good thing" (Kim)</p>
	Socially unifying (Paige, Victoria, Alexandra, Ella, Alice)	<p>"You go and meet the people that you're actually getting to know quite well and you start thinking, 'oh, I wonder how so and so's doing and if they'll be there tonight' and it's more of a social thing" (Alice)</p> <p>"I met up you know, with my group of other mother and baby friends, we'd meet up at the downs every Friday and we'd go for a nice walk around that and we'd walk... So that was quite nice, the social side of it; walking and talking" (Paige)</p> <p>"With the pregnancy yoga, we're all pregnant and we have time to sit and chat at the end" (Alice)</p> <p>"So I always loved sport but it was the team sport and then when I did kind of the zumba and all of that, (um) I developed a really good group of friends" (Ella)</p>
Limitations on PA	Physically uncomfortable (Paige, Victoria, Rebecca, Kim, Ella)	<p>"My lower back got quite painful at the end and to walk for ten-twenty minutes, or even just up the road, was really painful" (Rebecca)</p> <p>"Obviously it's uncomfortable, physically, and exhausting" (Ella)</p>
	Feeling restricted by changing body (Paige, Ella, Alice)	"Obviously, your ever-expanding waistline when you're pregnant and you do end up like the size of

		<p>a house and you can't do a lot, and you're like bloody hell" (Ella)</p> <p>"It's just yeah, you get to a point where you do just have to do yoga; you can't do anything else" (Alice)</p> <p>"I think that's why I don't like being pregnant because I can't do what I want to do and I find it restrictive" (Paige)</p>
	Tiredness (Victoria, Kim, Emily, Ella)	<p>"And in the evening, I was just knackered, you know I was going to be at half eight, nine o'clock. I was just so exhausted I couldn't think of doing anything else" (Kim)</p> <p>"Since then, I've got bigger and more tired (laughs)" (Ella)</p>
	Time (Emily, Alexandra)	<p>"The only things that stopped me doing anything were time" (Alexandra)</p> <p>"My point of view isn't that you leave your job to go and do a swimming class for example, and the majority of them are during the day when you can't go" (Emily)</p>
PA as a way to control the experience of pregnancy	Controlling weight gain (Victoria, Emily, Alice)	<p>"I completely understand and respect the fact that there is going to be fat gain during pregnancy, and I'm not trying to fight that but it's how much does there need to be" (Alice)</p> <p>"I don't ever like being bigger than a size 10, so being pregnant is a challenge in itself and obviously because you're huge at some points. (Um) So it was just that really and I didn't want to get fat as well as being pregnant" (Emily)</p>
	Helps birth (Paige, Victoria, Rebecca, Emily,	"I did always see it as important being fit and healthy and as strong as possible for the birth; being a

Alexandra, Ella, Alice)	massive physical thing that you have to go through" (Paige)
	"...it was my physical strength (um) and stamina I think that kept me going (um) through that time" (Rebecca)
	"Other people that I know who've had caesareans, said that I done really well and was up and about really quick" (Victoria)
	"The whole birth thing's going to be much easier" (Ella)
	"I was told obviously that if you are fitter and what you, it should make birth easier" (Emily)
Eases aches and pains (Victoria, Rebecca, Kim, Alexandra, Ella)	"Yeah, I had aches and pains and I think with Gareth, about a week before he was born, I went swimming a few times and I really liked it" (Kim)
	"I felt like I'd done something and actually those aches and pains that you get from sitting in stupid positions on the sofa because you can't get comfortable, it helped ease all those things" (Rebecca)
Perseverance (Alice)	"It's just the longevity of it and having to keep yourself from not going 'I've had enough'" (Alice)
Carrying on as normal (Paige, Victoria, Rebecca, Kim, Alice)	"If you carry on with a bit of exercise, it's more what you're used to, it's more the norm for you" (Paige)

Appendix M: Summary of Bracketing Interview

Some of my assumptions and how I will maintain neutrality

One of my assumptions is that that being told you are unable to have children naturally is probably a really upsetting and potentially traumatic experience. I would imagine this might still be an upsetting subject for some women to talk about, but this might not be the case for everyone so I think I need to remain sensitive to the topic area and take my cue from each participant, as their experiences and comfortableness talking about the IVF process and pregnancy are going to be unique.

I also wonder what it will be like going in to meet participants knowing that they know I work for the NHS. Some of the participants may have had really positive experiences of NHS care, but some of them may not. Again, this might influence the way in which participants interact with me so I need to be aware that I might not just be seen as a researcher/individual but as part of the wider NHS system. Participants might assume that I understand a particular experience they are describing (e.g. I've had experiences before where clients might say 'you work for the NHS, you understand'). I need to pause and make sure I encourage participants to elaborate on their own experience rather than either of us making an implicit assumption that I understand.

I wonder if the women who have volunteered to volunteer for this research will have a personal interest in exercise and therefore a view that it would be an important part of their pregnancy. As this was not the intention of my research, I need to be open and curious about hearing individual experiences and to make sure that this assumption does not stop me from listening out for experiences or stories which would not fit with that discourse.

What experiences might have led me to do this research?

IVF has received a lot more attention in recent years (e.g. more articles on the news, in magazines), particularly as it is now available on the NHS. It now seems as though it is less of a taboo subject to talk about, although I acknowledge that is my own impression as someone who has not undergone IVF-if I had, I might think about it quite differently. It will be interesting when I do the data analysis to see if that is the case. I think the increasing psychological research being done in relation to IVF mirrors the way in which it seems to have become a more mainstream treatment.

I have always been an active person and grew up in a very active family where exercise was really valued, both from a health point of view as well as a social point of view. Physical activity in my head has always been connected to living a healthy lifestyle. This is compounded by the media's portrayal of exercise (e.g. adverts about happy families exercising together and 'eating right') which I am sure I have

been influenced by. Sometimes exercise is discussed in relation to IVF in the media (e.g. articles relating to guidelines about women needing to lose weight in order to be eligible for IVF treatment). I need to remember that physical activity is not valued by everyone, and even if it is there might be many reasons why someone chooses not to engage in it. I therefore need to remain respectful and curious about the ways in which other women view physical activity and to listen and learn from their experiences.

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Appendix P: Summary of Findings for Participants and Ethics Panel

Dear XXXXX,

Thank you so much for participating in my research project. I really appreciated you taking the time to meet with me and to share your experiences. You let me know that you would like a summary of the findings from the project when they were available so please see the information below:

Background

This study explored the experiences of physical activity during an IVF or ICSI pregnancy for eight women who were either pregnant or had given birth within the last two years. I hoped to learn more about your experiences of IVF or ICSI treatment as well as your experiences of being physically active (or not) during pregnancy. For simplicity, I have referred to 'IVF treatment' in the themes below; however, this includes ICSI treatment.

Results

Between the eight of you, you had a broad range of experiences, which are summarised and explained below according to themes.

Navigating Away from Childlessness and Towards Motherhood

Nearly all of you talked about your experiences of being unable to conceive naturally, with social exclusion, loss of an imagined future, and a sense of failure and blame amongst the most commonly discussed topics. Some of you talked about the pressure you felt to 'deliver' given the significant investment you and your partners has made in IVF treatment. As a result, IVF often felt all-consuming. IVF was also experienced as an emotional journey which you all copied with in different ways; for example, by reaching out to others in a similar position (e.g. friends, or through internet forums), or by keeping the fact that you were undergoing IVF treatment a secret. Many of you talked about the hope that IVF provided you and your partner with, and how you felt it was important to give your body the best possible chance of conceiving. For some, this was through eating well and exercising; for others this was done through making sure your body was well rested and relaxed. Once you had reached the early stages of pregnancy, a number of you talked about the importance of your body providing protection for your babies, as well as the uniqueness of an IVF pregnancy which highlighted the need for protection even further.

Negotiating a Safe Passage

You all spoke about making sure you stayed safe during pregnancy, which included managing perceived threats. Some of you reported a preoccupation with what might go wrong during pregnancy which was understandable in light of the preceding IVF journey and struggle to become pregnant. Physical activity was experienced by the majority of you as a threat to pregnancy in the early stages, which seemed to moderate the amount of activity you took part in. One way to keep safe was to get to

a 'safe stage' before engaging in physical activity, however there was a lot of variation between you in terms of when this stage was. Lots of you spoke about how 'knowing your body' provided one way to stay safe during pregnancy (e.g. by knowing when to modify or tone down your level of exercise, listening to your body for warning signs). For a few of you this provided a way to satisfy your 'need to be active' in a safe way.

There seemed to be a huge variance with regard to the information you had access to about physical activity and pregnancy from both health professionals and your extended networks-some of you got lots of information, whereas some of you didn't get any. Some of you found the information you did get to be useful, informative, and you reported it gave you the confidence to engage in physical activity. For others, information was experienced as confusing or non-existent, which made it much more difficult to know what a 'safe' level of activity was during pregnancy.

Balancing the Challenges of Pregnancy with the Needs of the Self

This theme explored the ways in which you met your own physical and psychological needs whilst also balancing the physical challenges of pregnancy. For many of you, physical activity provided one way to do this. For some, physical activity seemed to serve a reparative function in light of your previous experiences of infertility (e.g. by facilitating feelings of success, emotional wellbeing, and health). Many of you also experienced physical activity as socially unifying. However, for some, the ability to engage in PA was often restricted due to physical limitations such as feeling uncomfortable, tired, and restricted by a changing body, or by more practical limitations such as lack of time. For those of you who did engage in physical activity during pregnancy, it seemed to provide a way to exert some control over the experience; for example, by controlling weight gain, easing aches and pains, and by helping the birthing process. Two strategies that allowed some of you to continue doing physical activity during pregnancy were perseverance and carrying on as normal as far as possible.

Summary

Whilst you all had differing experiences of physical activity and pregnancy, there were a number of shared experiences between you. The main themes have been summarised above; however, I have done my best to capture variations in each person's individual experience in my full write-up of the findings, as each person's experience is unique.

I hope you find this summary interesting and useful. If you have any questions about this research or the results, please do not hesitate to call me on XXXXX XXXXXX or email at XXXXX@XXXXXXXXXX.XX.XX.

Best Wishes,

Chloe Walker