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**PREDICTING AND UNDERSTANDING PHYSICAL ACTIVITY BEHAVIOUR  
DURING PREGNANCY: A MULTIPHASE INVESTIGATION.**

**by**

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for the Degree of Doctor of Philosophy**

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*Dei Gratia*

## **Abstract**

**Background:** The benefits of physical activity during pregnancy extend to both mother and baby, however, little is known about the reasoning behind expecting mothers' decision to initiate or maintain regular participation during this period. **Objective:** The main purpose of this research project was to investigate the socio-cognitive determinants of pregnant women's physical activity behaviour. **Method:** A mixed methods research approach using a multiphase design with the Theory of Planned Behaviour (TPB) as conceptual framework guided the investigation. Application of the TPB required both qualitative (Study One; n = 18) and quantitative (Study Two; n = 78) cross-sectional data to be collected which addressed the aims of understanding and predicting physical activity behaviour during pregnancy. A further qualitative study (Study Three; n = 10) involving semi-structured interviews with community midwives augmented the investigation. **Results:** Whilst findings from individual studies have merit, a major strength of this study pertain to the "meta-inferences" drawn from the combination of studies. Specifically, findings suggest that (1) pregnant women do not have access to the necessary information that would allow them to make informed decisions regarding their engagement in physical activities; (2) a co-ordinated effort is required to support pregnant women in overcoming barriers associated with regular exercise participation; and (3) profiling pregnant women according to motivation and behaviour status could serve as a useful and manageable starting point for intervening to produce positive changes in pregnant women's physical activity behaviour. **Conclusion:** In achieving better health and ensuring greater health outcomes for mothers and babies it is necessary to consider the factors involved in behaviour change, identify opportune moments to intervene, and involve health professionals in facilitating and supporting the lifestyle changes that may be required.

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## **Chapter 1: Introduction**

### **1.1 Reflexive background**

This journey of enquiry started with my own first experience of being pregnant. As a qualified exercise professional, I was both surprised and intrigued by the lack of advice and support I received in terms of being physically active. This is not to mention the many disapproving glowers when continuing to exercise throughout my pregnancy, although I can imagine it must have been quite a sight when at nearly nine months pregnant I was still an active gym member. Admittedly, I adapted my exercise routine as the pregnancy progressed so that I could still enjoy the benefits of being active whilst also being safe and comfortable. The ability to do this was, however, informed by my own knowledge and background which inevitably also made me think about other women's experiences of physical activity and the guidance they received.

Shortly following the birth of my daughter, I embarked on a part-time Master's degree in Applied Sport and Exercise Sciences. Still intrigued, I planned my first assignment around the topic at which point I became engrossed in literature concerning the determinants of physical activity behaviour during pregnancy. When I became pregnant with my second child two years later, I had a heightened sense of awareness and started asking specific questions. Unsatisfied with the status quo and convinced that it was a worthy topic for further investigation, I proposed a dissertation project with the aim of investigating physical activity behaviour in a community sample of pregnant women. However, as the study "would involve recruitment of subjects under the jurisdiction of the NHS [National Health Service]" therefore requiring ethical approval from the National Research Ethics Service (NRES) and considering "the time delays typically involved, the amount of work and the uncertainty of the outcome (in terms of getting

permissions to proceed”, I was advised against undertaking the study at that level (J. Erskine, personal communication, February 1, 2008).

Somewhat disheartened, I left it there and continued to engage in alternative research endeavours that would serve a directive purpose, that is, tick a box or please others. Research relating to physical activity during pregnancy, however, continued to advance during this time and would also see the introduction of exercise guidelines for pregnant women in the United Kingdom (UK). Specifically, following a review of evidence, the Royal College of Gynaecologists and Obstetricians (RCOG, 2006a) recommended that “all women should be encouraged to participate in aerobic and strength-conditioning exercise as part of a healthy lifestyle during their pregnancy” (p. 1). This juncture marked a significant change in perinatal research and practise as it was now accepted that, in most cases, it was safe for pregnant women to engage in physical activities (RCOG, 2006a).

## **1.2 Defining and guiding physical activity behaviour**

Caspersen, Powell, and Christenson (1985) originally distinguished between the concepts of physical activity and exercise with physical activity defined “as any bodily movement produced by skeletal muscles that results in energy expenditure” and exercise considered as “a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness” (p. 126). More recently, physical activity recommendations have been framed around exercise which denotes intentional physical activity with the specific aim of improving health outcomes (Garber et al., 2011). These benefits (including but not limited to improved cardiovascular, respiratory and metabolic function) have been well-established through scientific research, however, the

minimal dose of physical activity required in obtaining such benefits varies between health conditions and populations (American College of Sports Medicine; ACSM, 2006). For example, it would be necessary to engage in greater amounts of physical activity (i.e. 1,560 MET-minutes per week)<sup>1</sup> in order to lose weight whereas a lower volume (800 MET-minutes per week) is required to decrease the risk of cardiovascular disease (Physical Activity Guidelines Advisory Committee; PAGAC, 2008). Furthermore, the minimum amount of physical activity necessary for health benefits may differ between men and women and for older and younger adults (Garber et al., 2011). Thus, whilst it is not yet possible to produce specific physical activity guidelines for different conditions, it is clear that increased physical activity results in greater health benefits (ACSM, 2006).

Current exercise guidelines point to a weekly volume of 150 minutes or 2.5 hours of moderate intensity physical activity (i.e. 3-5 METs, or 450-750 MET-minutes, or 7.5-12.5 MET-hours per week) “as being associated with substantial benefits across a number of health outcomes and in diverse populations” (Department of Health; DH, 2011, p. 33). However, this reasoning has recently come into question with Weed (2016) pointing to the fact that there are significant benefits to be gained at volumes 40% below the minimum recommendation and that these benefits are being ignored in both guidelines and research. In terms of public health, it is therefore important to encourage physical activity, particularly in those who do not exercise regularly as “some activity is better than none” (ACSM, 2006, p. 6).

In line with those of the World Health Organization (WHO, 2009), the following exercise guidelines apply to the adult population (i.e. individuals between the ages of 19 and 64) in the UK:

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<sup>1</sup> Metabolic Equivalent (MET) is the unit representing physical activity intensity i.e. the ratio of metabolic rate during activity to metabolic rate at rest (Ainsworth et al., 2000).

1. Adults should aim to engage in physical activity on a daily basis, accumulating up to at least 150 minutes of moderate intensity aerobic activity per week, in bouts of 10 minutes or more;
2. Alternatively, adults should participate in 75 minutes of vigorous intensity aerobic activity throughout the week or an equivalent combination of moderate and vigorous intensity activity;
3. Adults should take part in physical activities to improve muscle strength on at least two days of the week; and
4. Adults should aim to restrict sedentary behaviour for prolonged periods (DH, 2011).

With regards to pregnant women, the RCOG (2006a), recommends that expectant mothers should continue to engage in physical activities in order to derive the same health benefits as they did prior to pregnancy. However, guidelines aimed at the general population do not take account of the anatomical changes and physiological demands associated with exercise during pregnancy, for example, an increased heart rate, cardiac output, minute ventilation, and energy expenditure; a shift in the point of gravity resulting in lordosis; and hormonal changes resulting in joint laxity and hypermobility (Evenson et al., 2014; American College of Obstetricians and Gynecologists; ACOG, 2015). The effect of these additional demands can be observed in pregnant women's activity choices and behaviours as pregnancy progresses. To compensate for increased energy demands, Löf (2011) noted that pregnant women ( $n = 18$ ) walked slower (1.1 metres per second) than non-pregnant women ( $n = 21$ ; 1.2 metres per second) and that they engaged in less demanding activities during free living. Nonetheless, in a recent review of pregnancy and exercise guidelines around the world, Evenson and colleagues (2014) identified and compared 11 guidelines of which most were supporting of moderate intensity physical activity during the pregnancy period. However, not all of these guidelines included



recommendations for women who were previously inactive. In the UK, the RCOG (2006a) advises that “previously sedentary women should begin with 15 minutes [of] continuous exercise three times a week, increasing gradually to 30-minute sessions four times a week to daily” whereas pregnant women who are regular exercisers “should be able to engage in the same higher intensity exercise programmes” (p. 5). Whilst survey data in England is lacking, population-based data from the United States indicate that few pregnant women meet the set guidelines; Petersen, Leet, and Brownson (2005) showed no real difference between pregnant (n = 6,528) and non-pregnant (n = 143,731) women meeting the guidelines for moderate exercise, that is, 10% and 13% respectively whilst Evenson, Savitz, and Huston (2004) reported that 16% of pregnant women (n = 1, 979) and 26% of non-pregnant women (n = 44,657) met the recommended guidelines for physical activity. In their review, Currie et al. (2013) report that an estimated 3-15% of pregnant women were conforming with the guidelines as compared to 24-26% of the non-pregnant female population.

Another point raised by Evenson et al. (2014) relates to the use of the terms physical activity and exercise. Indeed, it was noted that whilst physical activity is recognised as a broader term that included exercise, the terms were often interchanged. Similarly, the focus of this thesis is on physical activity behaviour which suggests an all-encompassing term incorporating occupational, household/caregiving, transport, exercise, and sports activities. Thus, consistent with pregnancy literature, the terms physical activity and exercise are used interchangeably throughout this thesis.

In their review, Evenson and colleagues (2014) also identified that most guidelines recommended that pregnant women seek advice from their healthcare professional prior to initiating or continuing with an exercise regime. Within the NHS, midwives play an essential

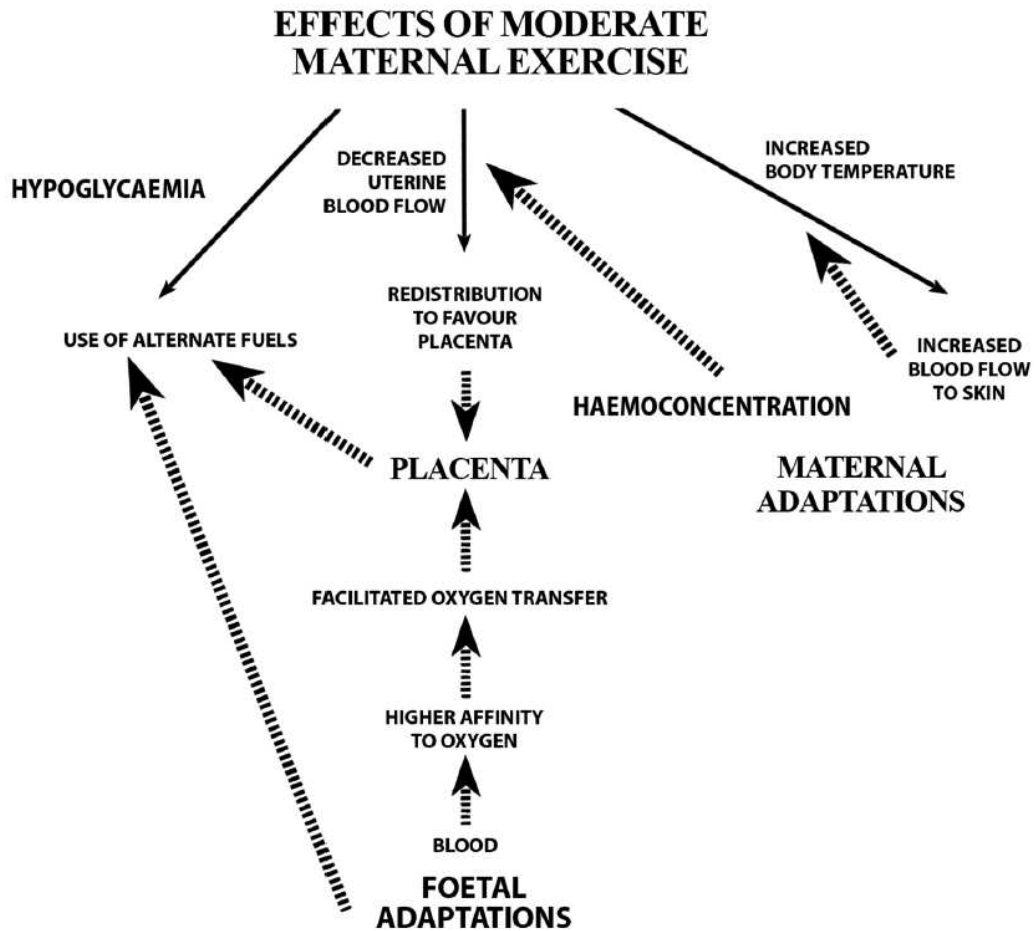
and direct part in the information that pregnant women receive, and it is therefore not surprising that they are regarded as being “ideally placed” to advise on diet and activity changes during pregnancy (Weir et al., 2010, p. 6). Evidence, however, suggest that there is variation in whether physical activity is routinely discussed during pregnancy (Heslehurst et al, 2014). Whilst Michie, West, Campbell, Brown, and Gainforth (2014) point out that failure to implement research findings into practice is a common occurrence, it may be that the value of physical activity guidance as part of the routine care that pregnant women receive is underestimated. Few studies have, however, focused exclusively on physical activity with the current focus being on managing the overweight/obesity epidemic through a reactive rather than proactive approach. Indeed, Evenson et al. (2014) call for further research to understand the utilisation of physical activity guidelines by health professionals whilst Evenson and Bradley (2010) suggest that more research is needed to understand what advice is being offered to pregnant women and how this is received and utilised by them. In their longitudinal explorative study involving a series of three semi-structured interviews with 30 pregnant women, Van Mulken, McAllister, and Lowe (2016) showed that a lack of physical activity knowledge by health professionals and society in general caused expectant mums to experience anxiety and perceive pregnancy as a fragile condition which ultimately led to a reduction in physical activity participation. The authors encouraged an improved understanding of the guidelines “as an important strategy to increase the level of agency and physical activity levels during pregnancy” (p. 927). In attempting to understand physical activity behaviour during pregnancy, this research project will also give consideration to midwives’ perceived responsibility, barriers, and opportunities in providing effective advice and guidance to expectant mothers.

### **1.3 Are efforts to encourage physical activity during pregnancy worthwhile?**

Early research on regular exercise during pregnancy has focused largely on possible harm to mother and foetus rather than the potential benefits to be gained and apprehensions in this regard remains evident (Pivarnik et al., 2006). Indeed, Van Mulken et al. (2016) found that expectant mothers perceived a “social expectation to reduce physical activity to low intensity and low impact activities and to avoid any physical labour at work” (p. 928). Despite increasing evidence in favour of active pregnancies, concerns among pregnant women, obstetricians, gynaecologists, and healthcare professionals endure regarding the developing foetus, labour and birth outcomes (Bauer, Broman, & Pivarnik, 2010; ACOG, 2015; Bø et al., 2016b). Research has, however, shown that maternal, placental and foetal adaptations occur to protect the foetus from potential risks, thus, in most low risk pregnancies the benefits far outweigh any theoretical risks (Bø et al., 2016a; see Figure 1.1).

Continued inactivity and increasing levels of sedentary behaviour is, however, a universal crisis that warrants consideration and investigation (WHO, 2009). During pregnancy, a sedentary lifestyle may contribute to decreased muscular and cardiovascular fitness, excessive gestational weight gain (GWG) and postpartum retention, increased risk of gestational diabetes mellitus (GDM), increased risk of pre-eclampsia, development of varicose veins, increased prevalence of physical complaints such as dyspnoea (i.e. shortness of breath) or lower back pain, and poor psychological adjustment in response to the physical changes associated with pregnancy (RCOG, 2006a). Although it is important to recognise that “increasing the activity levels of all [pregnant women] who are not meeting the recommendations is important, targeting those [pregnant women] who are significantly inactive (i.e. engaging in less than 30 minutes of activity per week) will produce the greatest reduction in chronic disease” (DH, 2011, p. 10).

In terms of public health, two of the main maternal health benefits of an active pregnancy include a reduced risk of developing GDM and prevention of excessive GWG (Mudd, Owe, Mottola, & Pivarnik, 2012; Da Silva, Ricardo. Evenson, & Hallal, 2016).



\*Solid arrows represent potential effects of maternal exercise.

\*\*Dashed arrows represent maternal, placental and foetal adaptations in a low risk pregnancy to offset potential effects of maternal exercise.

Figure 1.1: Flow chart of maternal, placental and foetal adaptations to exercise (Bø et al., 2016a, p. 575).

In their systematic review and meta-analysis examining the relationship between physical activity and GDM involving eight studies, Tobias, Zhang, Van Dam, Bowers, and Hu (2011) found greater levels of physical activity before and during the early stages of pregnancy to be

significantly related to a lower risk of GDM. Specifically, pre-pregnancy physical activity showed a 55% lower risk in developing GDM [OR = .45 (95% CI: .28 - .75),  $p = .002$ ] whilst early pregnancy physical activity indicated a 24% lower risk [OR = .76 (95% CI: .70 - .83),  $p < .0001$ ]. This finding is of substantial importance when considering that GDM is associated with adverse perinatal outcomes including macrosomia (i.e. babies weighing more than 4 kg at birth), hypocalcaemia, jaundice and birth trauma (Bø et al., 2016a). In addition, when diagnosed with GDM both the mother and her offspring are at a higher risk of developing type 2 diabetes in future (WHO, 2016). The prevalence of diabetes in the global population has increased from 4.7% in 1980 to 8.5% in 2014 (WHO, 2016). To put this in context, the estimated direct costs of treating diabetes in the UK stands at £9.8 billion per annum with this figure predicted to rise to £16.9 billion by 2035/6, that is, 17% of the total NHS budget (Hex, Bartlett, Wright, Taylor, & Varley, 2012).

Another important maternal health factor relates to the amount of weight gained in the period between conception and delivery (Bø et al., 2016a). Guidelines for appropriate weight gain based on a women's pre-pregnancy body mass index (BMI) have been set by the Institute of Medicine (IOM, 2009; see Table 1.1). Excessive GWG in the first pregnancy (i.e. exceeding the upper range for total weight gain as per IOM guidelines) and short interpregnancy periods (i.e. less than 12 months) are risk factors in the development of maternal obesity (Davis et al., 2014). Moreover, weight gained during pregnancy is directly related to postpartum weight retention (Mudd et al., 2012). In a large Swedish population-based study spanning nine years ( $N = 151,025$ ), Villamor and Cnattingius (2006) showed that weight gained during the interpregnancy interval (i.e. difference between BMI measurements obtained during the first trimesters of each subsequent pregnancy) is strongly related to the risk of adverse maternal and infant outcomes. Specifically, for each one to two BMI units gained during an average period

of two years, the risk for gestational hypertension (e.g. pre-eclampsia), GDM, or macrosomic babies increased by an average of 20 to 40% and a gain of three or more BMI units brought about a 63% increased risk of stillbirth compared to those women whose weight remained consistent.

Table 1.1: IOM recommendations for GWG by pre-pregnancy BMI (2009, p. 2).

<b>Pre-pregnancy BMI</b>	<b>BMI (kg/m<sup>2</sup>)</b>	<b>Total weight gain range (lbs)</b>	<b>Rates of weight gain second and third trimester (Mean range in lbs/week)</b>
Underweight	< 18.5	28 - 40	1 (1 – 1.3)
Normal weight	18.5 – 24.9	25 - 35	1 (0.8 – 1)
Overweight	25 – 29.9	15 - 25	0.6 (0.5 – 0.7)
Obese	≥ 30.0	11 - 20	0.5 (0.4 – 0.6)

The problem of excessive GWG is further compounded by the fact that current trends in national statistics suggest that in England more women are entering pregnancy as either overweight or obese (Heslehurst, Rankin, Wilkinson, & Summerbell, 2010). Specifically, during 2014, 58% of adult women were classified as being either overweight or obese (Health & Social Care Information Centre, 2016). Not only is maternal overweight and obesity associated with adverse pregnancy outcomes but total healthcare costs are higher compared to pregnant women with a normal BMI, that is, 23% in the case of overweight women and 39% for obese women (Morgan et al., 2014).

In relation to public health and the economic burden of disease, it is also important to acknowledge that excessive GWG increases the risk of childhood obesity. For example, in a prospective birth cohort study involving 727 African-American and Dominican mothers

residing in New York, Widen et al. (2015) reported that at age seven, 22% of children born to participating mothers were obese with excessive GWG associated with higher child BMI, body fat percentage, and waist circumference. Specifically, after the authors controlled for the average effect of GWG, they found that every increase of five BMI units (or 5 kg/m<sup>2</sup>) resulted in a 53% likelihood of offspring obesity at age seven [RR = 1.53 (95% CI: 1.21-1.92)]. During 2014, nearly a third of children in England between the ages of 2 and 15 were classified as being overweight or obese (Health & Social Care Information Centre, 2016). Clearly the issues involved are complex and cannot be considered in isolation; if the reoccurring cycle of obesity is to be disrupted more needs to be done to reduce the risk of overweight and obesity. This implies an increased responsibility in women of childbearing age to maintain a healthy weight before, during and after (or between) pregnancies.

Being physically active during pregnancy has been shown as an effective way of managing weight during gestation. In a recent meta-analysis comparing weight gain in pregnancy between experimental and cohort studies, Da Silva and colleagues (2016) found that physically active women gained less weight during pregnancy. Specifically, data pertaining to randomized controlled trials showed that women taking part in exercise interventions (n = 1,605) gained on average 1.11 kg less than those not taking part (n = 1,598) whilst cohort data (n = 9,795) found that compared to inactive women, active women had an 18% lower risk of GWG that exceeded the IOM recommendations [OR = .82 (95% CI: .68-.99)]. These findings reflect those of a previous meta-analysis involving 12 randomized control trials; Streuling et al. (2011) showed that pregnant women in exercise intervention groups had a significantly lower average GWG (0.6 kg) compared to control groups (p < .05). However, the findings of these meta-analyses are in contrast to an earlier Cochrane review involving only four studies (n = 122); Kramer and McDonald (2010) concluded that there was no difference in total GWG

between pregnant women who participated in aerobic exercise and those who did not [ES = .79 (95% CI: -.73-2.31)].

Receiving considerable attention in current literature is the fact that “much of the influence of the intrauterine milieu is transmitted to the next generation through epigenetic mechanisms” (Luoto, Mottola, Hilakivi-Clarke, 2013, p. 1). This concept of foetal programming first gained recognition through what is known as the “foetal origins of adult disease” (FOAD) or “Barker’s hypothesis” (Barker, 2013; Calkins & Devaskar, 2011). Specifically, Barker (as cited in Calkins & Devaskar, 2011) observed that low birth weight served as indicator of poor foetal growth and nutrition. He later concluded that adverse stimuli (e.g. malnutrition, stress, environmental exposures, etc.) during the early stages of development cause permanent and lasting changes in hormonal and metabolic processes thereby increasing the risk for developing chronic diseases (Barker, 2013). In as early as 1996, Clapp demonstrated programming effects related to physical activity during pregnancy by showing that babies born to mothers who exercised (n = 20) weighed less and had less subcutaneous fat at birth and five years of age compared to children born to mothers who did not exercise during their pregnancy (n = 20). This “is not that the offspring of the exercising women are unduly lean at age five years, rather that the offspring of the control subjects are a bit on the fat side” (p. 861). In a porcine animal model, Bahls et al. (2014) found that forced participation in a maternal aerobic exercise program (n = 7), consistent with the recommendations for physical activity in humans, resulted in vascular smooth muscle relaxation in the femoral arteries of adult offspring (n = 17). Due to similarities between human and swine cardiovascular systems, the authors conclude that their findings demonstrate a relationship between pregnancy physical activity and long term improved vascular function in offspring. Programming effects related to maternal exercise have, however, not been consistent. Using data from the Avon Longitudinal Study of Parents



and Children (ALSPAC), Millard, Lawlor, Fraser, and Howe (2013) found that whilst physical activity during pregnancy was associated with lower pre-pregnancy BMI in mothers and greater physical activity in children as measured by accelerometry at 14 years of age, the evidence was not strong enough to link it to cardiovascular risk factors in offspring (n = 4,665 mother-offspring pairs). However, it should be noted that this study was reliant on self-reported leisure time physical activity data provided by participating mothers at 18 weeks of gestation which did not include occupational, transport, or caregiving activities.

Managing maternal overweight and obesity is a growing challenge, however, greater efforts should be made in supporting women of childbearing age in optimising their weight before conception and managing weight during pregnancy to prevent excessive GWG, particularly in first pregnancies (Centre for Maternal and Child Enquiries; CMACE, 2010). Given the influence of the intrauterine environment on future disease risk, these strategies are also relevant in addressing the childhood obesity epidemic (Olson, Strawderman, & Dennison, 2009). Furthermore, postnatal women should be educated regarding the risks of short interpregnancy intervals and offered suitable contraception advice (Davis et al., 2014).

#### **1.4 Rationale for the use of theory in perinatal research**

It is now recognised that the lifestyle choices a woman makes when pregnant can have profound effects on her own health but also on that of her baby and that these implications extend beyond the period of gestation and birth (Artal & O'Toole, 2003; Mudd, Owe, Mottola, & Pivarnik, 2012). In recognition of the evidence and the accompanying responsibility to encourage regular physical activity during pregnancy, it is necessary to draw on relevant theories of behaviour and/or behaviour change to fully understand the contextual nature of the

problem, develop appropriate behaviour change interventions, and improve professional practise (Michie, West, Campbell, Brown, & Gainforth, 2014; Davis, Walker, & Grimshaw, 2010; Campbell et al., 2007).

In their review, Davis, Campbell, Hildon, Hobbs, and Michie (2015) identified 82 theories of behaviour and behaviour change in operation across social and behavioural disciplines. Despite the many theories being available, Ayers and Olander (2013) maintain that perinatal research remain predominantly atheoretical. Indeed, a literature review of the patterns and determinants relating to pregnancy and physical activity behaviour identified only eight studies that have considered theory-based predictors as part of their investigations (Gaston & Cramp, 2011). Specifically, Evenson, Moos, Carrier, and Siega-Riz (2009) used a socio-ecological framework to examine pregnant women's perceived barriers to exercise through intrapersonal; interpersonal; neighbourhood and environmental; and organizational and policy factors. Cramp and Bray (2009) examined barrier and exercise self-efficacy (i.e. Social Cognitive Theory) as predictors of leisure time physical activity. Hinton and Olson (2001) evaluated the associations between physical activity and several psychosocial variables including: attitudes toward GWG, feelings about motherhood, career role orientation, self-efficacy, locus of control, body image, and social support. And finally, five connected studies were published in relation to examination of the Theory of Planned Behaviour (TPB) variables (Symons Downs & Hausenblas, 2004; Hausenblas, Symons Downs, Giacobbi, Tuccitto, & Cook, 2008; Hausenblas & Symons Downs, 2004; Symons Downs & Hausenblas, 2003; Symons Downs & Hausenblas, 2007).

Furthermore, a recent systematic review pertaining to behaviour change interventions with the aim of increasing physical activity during pregnancy reported that only two of the included

studies were informed by theory (Currie et al., 2013). Whilst these two studies used different theoretical frameworks, both reported desirable outcomes in terms of exercise behaviour. Specifically, Gaston and Prapavessis (2009) utilized the Protection Motivation Theory to design factual brochures regarding maternal-foetal diseases which served as source of exercise motivation whilst Chasan-Taber et al. (2011) based their intervention on constructs drawn from the Transtheoretical Model and Social Cognitive Theory to develop a 12-week individual counselling program delivered by health educators. Neither of these interventions have, however, taken pregnant women's past physical activity behaviour into account and Currie and colleagues (2013) note that "physical activity at baseline have the potential to influence the outcome to a greater extent than the intervention itself" (p. 11).

Symons Downs, Chasan-Taber, Evenson, Leiferman, and Yeo (2012) recognise that whilst progresses have been made in perinatal research, the fact that this has been largely atheoretical underscores the need for "theoretically-driven observational studies to better understand the complex interactions among the psychological, behavioural, and biological determinants of prenatal physical activity to develop more effective interventions" (p. 500). The application, development and testing of theory is crucial in the advancement of knowledge and understanding of perinatal phenomena (Ayers & Olander, 2013).

## **1.5 The Theory of Planned Behaviour (TPB)**

### **1.5.1 Rationale for the use of the TPB**

Having identified the need for theory to be applied in the investigation of perinatal behaviours, two issues stand out as being of particular relevance in the examination of pregnant women's physical activity behaviour and the choice of theoretical framework to guide this investigation.

Firstly, before investing resources in interventions with the aim of changing or indeed supporting pregnant women's physical activity behaviours, it is necessary to have a greater fundamental understanding of the modifiable factors influencing women's decisions during this time. Secondly, it is important to recognise that pregnancy represents a change in lifestyle which requires physical activity behaviour prior to pregnancy to be taken in consideration. One theoretical framework that can be viewed as starting point for understanding physical activity behaviour during pregnancy and one which is flexible enough to consider the role of past behaviour is Ajzen's (1991) TPB. Indeed, it is regarded by the scientific community as a foundation from which revisions, expansions and new theories can progress (Hagger, 2015). This viewpoint is justified by the fact that the TPB involves "major theoretical constructs that have proved their utility over the years" and in various forms and combinations constitute the basis for several theories of behaviour and behaviour change (Fishbein & Ajzen, 2010, p. 401). Thus, whilst it is acknowledged that physical activity behaviour may ultimately be best represented by a hybrid theory, the TPB provides a vantage point from which these developments can follow.

Furthermore, in reviewing the literature pertaining to pregnancy physical activity behaviour, it has become apparent that previous researchers have shared these sentiments and turned to the TPB to gain a better understanding of pregnant women's engagement with physical activities (e.g. Symons Downs & Hausenblas, 2003; Hausenblas & Symons Down, 2004; Symons Downs & Hausenblas, 2007). However, it is important to note that not any of these studies involved a sample from the United Kingdom. Not only will such a study allow for comparison with pregnant populations from other countries but the accumulation of evidence "provide a basis for meta-analyses and other attempts to derive general conclusions about the theory's

predictive validity and about the relative weights of [it's] components” (Fishbein & Ajzen, 2010, p. 405).

### **1.5.2 Overview of the TPB**

In their earlier work concerning the Theory of Reasoned Action (TRA), Ajzen and Fishbein (1980) maintained that behaviour can be explained in terms of a limited number of concepts, specifically, an individual's ultimate behaviour is influenced primarily by their intention to perform (or not perform) that behaviour. Intention, in turn, is a function of two determinants, one personal in nature (i.e. attitude) and the other representing social influence (i.e. subjective norm; Ajzen & Fishbein, 1980). Attitude in this context is defined as a disposition to respond with some degree of favourability or unfavorability to a certain behaviour or object (Fishbein & Ajzen, 2010). Thus, an individual who believes that engaging in a certain behaviour will result in mostly positive consequences will hold a favourable attitude toward performing that behaviour, whereas an individual who believes that performing that behaviour will lead to mostly negative consequences will hold an unfavourable attitude (Ajzen & Fishbein, 1980). Subjective norm refers to the perceived social pressure to engage in a specific behaviour, therefore, an individual will perceive social pressure to engage in a certain behaviour if he/she believes that most people whose opinion they value think that he/she should perform that behaviour, whereas an individual will perceive social pressure to avoid a certain behaviour if he/she believes that most people whose opinion they value think that he/she should not perform that behaviour (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 2010).

The TRA was, however, only concerned with behaviours under complete volitional control and in order to account for behaviours where control was insufficient, a third determinant, perceived behavioural control (PBC), was added by Ajzen (1991). PBC refers to an

individual's perception of their ability to perform a certain behaviour and whether they have control over its performance (Fishbein & Ajzen, 2010). This extended theory, the TPB, has since been used to predict and explain a variety of behaviours, including smoking cessation (Norman, Conner, & Bell, 1999), breastfeeding (Lawton, Ashley, Dawson, Waiblinger, & Conner, 2012), binge drinking (French & Cooke, 2012), blood donation (Giles, McClenahan, Cairns, & Mallet, 2004), screening uptake (Michie, Dormandy, French, & Marteau, 2004) and exercise (Rhodes & Courneya, 2003). Indeed, several reviews and meta-analyses have been produced attesting to its effectiveness and illuminating the relationships between constructs in different contexts (see Godin & Kok, 1996, Hausenblas, Carron, & Mack, 1997; Armitage & Conner, 2001; Hagger, Chatzisarantis, & Biddle, 2002; Symons Downs & Hausenblas, 2005a).

However, in recent years the TPB have come under the spotlight with its utility questioned by Sniehotta, Penseau, and Araújo-Soares (2014). Renewed interest, certainly from Ajzen (2015) himself, was seen in response to address some of the issues raised (for commentaries see Trafimow, 2014; Abraham, 2015; Armitage, 2015; Conner, 2015; Gollwitzer & Oettingen, 2015; Hall, 2015; Ogden, 2015; Rhodes, 2015; Schwarzer, 2015). What became clear is that very few researchers made the effort to carry out formative research to inform both TPB studies and behaviour change interventions, an approach that Ajzen (2015) considers "cavalier" (p. 4) indicating "a profound misunderstanding of the theory itself" (p. 6). Through a recent three level meta-analysis spanning across domains, Steinmetz, Knappstein, Ajzen, Schmidt, and Kabst (2016) showed that interventions based on the TPB were effective in changing behaviours [ $\delta = .50$  (95% CI: .24-.75)]. They also found that increasing skills, persuasion and motivation were successful behaviour change methods associated with TPB interventions. These findings certainly put to rest Sniehotta and colleagues' (2014) comments regarding the inability of the TPB to assist researchers and practitioners in developing appropriate

interventions. To advance the discourse of physical activity behaviour during pregnancy, this research project will apply both formative and definitive stages of the TPB.

## **1.6 Aim and structure of the thesis**

To understand physical activity behaviour “at critical transitional phases during childhood, adolescence and adult life”, Allender, Cowburn, and Foster (2006, p. 834) call for a mix of quantitative and qualitative methods to be employed during investigation allowing for a comprehensive evaluation of the determinants involved. Specifically, a single data source may be inadequate in addressing a multifaceted problem resulting in an incomplete understanding of the contributing factors (Creswell & Plano Clark, 2011). In response to the complex and related nature of the issues associated within the behaviour under investigation, several of the reasons identified by Bryman (2006) can be used to justify a mixed methods research approach in this project. These are summarised in Table 1.2.

### **1.6.1 Purpose statement**

This mixed methods study aims to investigate the socio-cognitive determinants of physical activity during pregnancy through a multiphase investigation. A multiphase research design is characterized by individual studies, each addressing a set of research questions whilst also advancing an overarching research objective (Creswell & Plano Clark, 2011). In the first instance, the application of the TPB provides a framework with the requirement to collect both qualitative (Study One) and quantitative (Study Two) data with the aims of understanding and predicting physical activity behaviour during pregnancy. To appreciate the context of the behavioural phenomena under investigation and in recognition of the central role that midwives

play in the care of pregnant women, a further qualitative study (Study Three) is also included to augment the investigation.

Table 1.2: Reasons for combining quantitative and qualitative research methods (Bryman, 2006, pp. 105-107).

<b>Rationale</b>	<b>Description</b>
Triangulation	Combination of findings with the purpose of corroboration.
Offset	Offset the weaknesses and draw on strengths of both methods.
Completeness	Provides a more comprehensive account of the phenomena under investigation.
Research questions	Quantitative and qualitative research can answer different research questions.
Explanation	One method is used to explain the findings produced by the other.
Instrument development	Qualitative research is used to develop questionnaire and scale items.
Credibility	Using both methods enhances the integrity of findings.
Context	Qualitative research provides contextual understanding of the relationships identified through quantitative research.
Illustration	Using qualitative data to illustrate quantitative findings.
Utility	Combining methods will yield results that is more useful to practitioners and others.
Enhancement	Making more of the findings from one method by using other method in addition.

### **1.6.2 Structure of the thesis**

The thesis presented here is structured around eight chapters which illustrates the research process involved in carrying out this mixed methods research project. Chapter One provides both an introduction to the research problem and rationale for the investigation thereof. A



broad literature review is integrated to illustrate the complexity of the issues involved and identifies (a) the TPB as a relevant conceptual framework for the investigation of physical activity behaviour during pregnancy, and (b) mixed methods as a suitable research methodology to guide the research project. Chapter Two represents a meta-analytic review of the literature pertaining to the application of the TPB to the pregnant population. These findings inform the research questions guiding this investigation. Chapter Three provides a discussion of the methodology pertaining to this mixed methods study and includes an explanation of the research design in context of the research problem. Chapter Four, Five, and Six represents the individual studies forming part of the multiphase research design. Specifically, Chapter Four comprises Study One which involved an elicitation study of pregnant women's exercise beliefs. These beliefs were used to construct a TPB questionnaire which was subsequently implemented in Study Two and informed the semi-structured interview schedule applied in Study Three. Chapter Five depicts Study Two where pregnant women were required to complete the newly developed TPB questionnaire and a measure of pregnancy physical activity behaviour on two separate occasions. These findings provided the basis for the prediction of physical activity during pregnancy. Chapter Six describes Study Three which involved semi-structured interviews with midwives regarding their perceptions and practices in relation to providing physical activity advice and guidance during pregnancy. Chapter Seven draws together the findings from the individual studies through triangulation and identifies avenues for intervention and further research. Finally, Chapter Eight involves a discussion of the limitations identified and provides a summary of the project's strengths and contribution to existing knowledge.

## **Chapter 2: Research synthesis**

The main purpose of a literature review is to describe the research that has previously been done in relation to a specific topic (Petre & Rugg, 2010). Borenstein, Hedges, Higgins, and Rothstein (2009), however, identify two important limitations of narrative literature reviews. Firstly, narrative reviews involve the subjective selection and interpretation of studies and lack transparency in reporting how these decisions were made. Secondly, narrative reviews “become less useful as more information becomes available” thereby inferring that narrative reviews cannot meaningfully synthesize findings from all relevant studies which may be particularly pertinent in situations where the reported effects between studies vary (p. xxii). By contrast, a meta-analysis is a technique of literature review that is “not simply a summary of the related literature; it is a logical type of research that leads to valid conclusions, hypothesis evaluations, and the revision and proposal of theory” (Thomas & Nelson, 2001, p. 237).

Being pragmatic, this meta-analysis came about when faced with a situation early in the doctoral journey epitomised by frustration in having to deal with layers of bureaucracy and experiencing subsequent delays in obtaining the necessary permissions required before being able to start the project. The conclusions drawn from this research synthesis served the purpose of guiding the research questions for this project. In addition, publishing this work in a peer reviewed journal prior to submission of the thesis serve as “evidence of significance, originality, and contribution to knowledge” (Petre & Rugg, 2010, p. 13).

The following chapter has been adapted for this thesis from an Accepted Manuscript of an article published by Taylor & Francis in the *Journal of Reproductive and Infant Psychology* on 25/09/2015, available online: <http://dx.doi.org/10.1080/02646838.2015.1118022>

## 2.1 Introduction

The notion that attitudes influence behaviour has attracted a great deal of research (Armitage & Christian, 2003). Although the term is often used in general discourse to reflect an opinion; attitude is best described as an individual's disposition to react favourably or unfavourably with respect to a specific object, construct or behaviour (Fishbein & Ajzen, 2010). One theoretical model linking attitude with behaviour is the TRA which posits that behaviour is primarily determined by an individual's intention to perform that behaviour (Ajzen & Fishbein, 1980). Intention (or an individual's stated orientation towards behaviour), in turn, represent the motivational factors of (1) attitude (a construct based on behavioural beliefs around the likely consequences of engaging in a specific behaviour) and (2) subjective norm (a construct based on normative beliefs representing the perceived pressure to conform to the perceptions of significant others regarding a specific behaviour (Ajzen & Fishbein, 1980; Ajzen, 1991; Fishbein & Ajzen, 2010). Whilst the TRA was successful in predicting volitional behaviours, it did not account for behaviours where volitional control was incomplete (Ajzen, 1991). In response, Ajzen (1991) extended the theory by adding to it the concept of PBC (a construct based on control beliefs signifying the perceived ability with which one can carry out a specific behaviour; Fishbein & Ajzen, 2010; see Figure 2.1). Several studies have since then supported the efficacy and predictive utility of the TPB in explaining a variety of behaviours including physical activity (for reviews see Blue, 1995; Hausenblas, Carron, & Mack, 1997; Hagger, Chatzisarantis, & Biddle, 2002; Symons Downs & Hausenblas, 2005a). For example, a meta-analysis of 31 exercise related studies incorporating at least two of the constructs contained within the TRA/TPB reported a large effect size (ES) between attitude and intention to exercise [ES = 1.22 (95% CI: 1.12-1.32)], whilst subjective norm only had a moderate impact [ES = .56 (95% CI: .43-.69); Hausenblas, et al., 1997]. PBC, however, showed a large effect on both

intention to exercise [ES = .97 (95% CI: .88-1.05)], and exercise behaviour itself [ES = 1.01 (95% CI: .91-1.11)]. The authors concluded that their study “provide strong evidence that the TRA is a good theory; its extension, the TPB, is an even better theory” (p. 47). To establish the predictive utility of the theory constructs, Symons Downs and Hausenblas (2005a) later followed up on this study with a meta-analytic review that included a further 80 TRA/TPB and exercise studies. They found intention to be the strongest predictor of exercise behaviour (ES = 1.01 (95% CI: ±.009)], whilst attitude was the strongest determinant of intention to exercise [ES = 1.07 (95% CI: ±.008)]. Together attitude, subjective norm and PBC accounted for 30.4% of the variance in intention to exercise, whereas intention and PBC explained 21.0% of the variance in exercise behaviour.

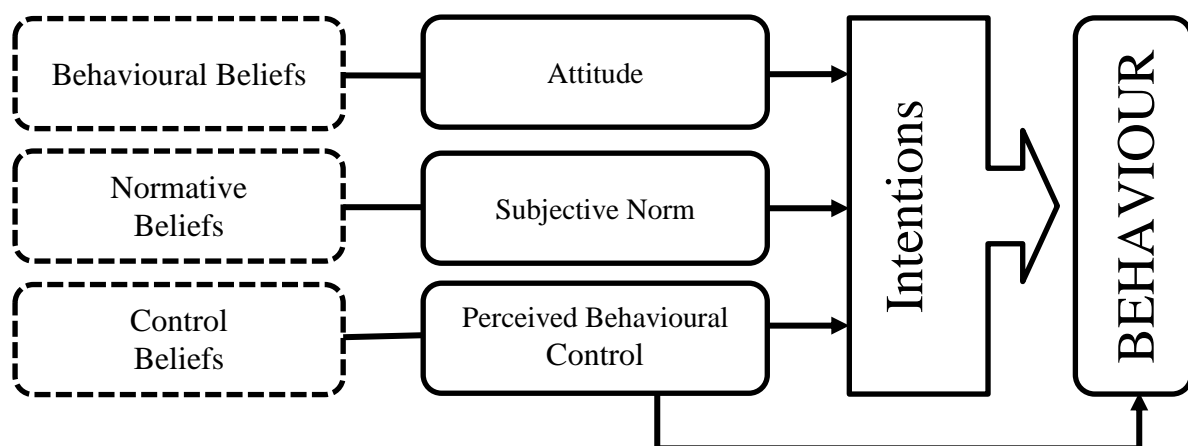


Figure 2.1: Schematic representation of the TPB (adapted from Ajzen, 2006).

The relative contribution of attitude, subjective norm, and PBC in the prediction of intention is, however, expected to vary between behaviours and situations (Ajzen, 1991). When it comes to exercise behaviour this may be particularly relevant for special populations such as pregnant women at risk of sedentary behaviour (Symons Downs & Hausenblas, 2005b). Whilst the benefits of an active lifestyle during pregnancy are well documented (Pivarnik et al., 2006), literature consistently shows that physical activity participation decreases in both frequency

and intensity as pregnancy advances (Poudevigne & O'Connor, 2006; Gaston & Cramp, 2011). Poudevigne and O'Connor (2006) suggest that the reasons for this occurrence may be "numerous and complex" (p. 27) whilst Symons Downs et al., (2012) describe them as "multilevel factors" (p. 491). Yet, without an understanding of the psychosocial determinants involved in exercise initiation and continuation during this time, it is unlikely that behaviour change interventions aimed at pregnant women will be appropriate (Godin, Valois, & Lepage, 1993; Gaston, Cramp, & Prapavessis, 2012). In addition, women could miss out on numerous health benefits which may in turn have implications for their long-term health (Gaston & Cramp, 2011).

As a society, our view of exercise during pregnancy has changed dramatically over the past two decades with pregnancy no longer being considered a condition for confinement and the effects of a sedentary lifestyle requiring consideration (Artal & O'Toole, 2003; Ribeiro & Milanez, 2011; Jukic et al., 2012). However, physical activity interventions aimed at pregnant women have not typically been based on relevant theoretical frameworks thereby limiting their effectiveness and importance (Gaston & Cramp, 2012). A recent systematic review of such interventions found that only four of the eleven interventions selected for inclusion were based on a theoretical model (Pearce, Evenson, Symons Downs, & Steckler, 2013). Methodological weaknesses of the included studies, however, limited the validity and interpretation of findings and the authors emphasized the need for further research to effectively design and evaluate interventions to promote physical activity during pregnancy. Whilst the TPB is not a theory of behaviour change in itself, it is considered a useful framework for designing effective behaviour change interventions as it differentiates between motivating those who are not inclined to carry out a specific behaviour and enabling others who already have positive intentions towards performing that behaviour (Ajzen, 2015).

The purpose of this study is therefore to review the existing literature surrounding the application of the TPB in explaining physical activity intentions and behaviour during pregnancy and to evaluate the effectiveness of the TPB in doing so. Specifically, the objectives of this review are to investigate (a) the efficacy of the TPB in explaining pregnant women's exercise intention and to determine which theoretical construct has the greatest effect on intention, (b) the efficacy of the TPB in explaining pregnant women's exercise behaviour and to determine which theoretical construct has the greatest effect on exercise behaviour during pregnancy, and (c) to quantify the relationships between all the remaining constructs within the TPB. Based on the literature outlined earlier, it is hypothesized that attitude would have the greatest effect on intention to exercise during pregnancy and that intention has the greatest influence on pregnant women's exercise behaviour.

## **2.2 Method**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009) was used as a guideline for the development and reporting of this meta-analysis.

### **2.2.1 Literature search strategy**

In a recent review of literature pertaining to the patterns and determinants of exercise during pregnancy, Gaston and Cramp (2011) identified only five studies that examined TPB variables. Of these, one included a multi-level analysis that combined two of the other publications. To ensure that all relevant studies were considered for this review, multiple search strategies were employed. Firstly, computer-based literature searches of the databases PsychINFO, PubMed, ScienceDirect, and SPORTDiscus were conducted during August to November 2013 using

various combinations of keywords related to the TPB (i.e. beliefs, attitude, subjective norm, PBC, intention), exercise or physical activity, and pregnancy (or pregnant woman or expectant mother; see Table 2.1). Secondly, Google Scholar, SCIRUS and ProQuest Dissertations and Theses (UK & Ireland) were searched to locate unpublished material. Thirdly, the reference lists of all the included studies were scrutinised for potentially relevant studies. Finally, key authors were contacted to identify any additional research studies that could be eligible for inclusion.

Table 2.1: Literature search strategy template.

<b>Theme</b>	<b>Keywords</b>	<b>Search Combinations</b>
1	(pregnancy) OR (pregnant woman) OR (expectant mother)	-
2	(exercise) OR (physical activity)	-
3	(theory of planned behaviour)	1, 2, 3
4	(beliefs)	1, 2, 4
5	(intention)	1, 2, 5
6	(attitude)	1, 2, 6
7	(subjective norm)	1, 2, 7
8	(perceived behavioural control)	1, 2, 8

### **2.2.2. Eligibility criteria**

A study was considered for this review if: (a) it examined at least two of the constructs as defined by the TPB (i.e. attitude, subjective norm, PBC, intention, and behaviour) and reported at least one relationship between them, (b) the target behaviour was specified as exercise or

physical activity during pregnancy, (c) material was available in the English language, and (d) it yielded usable statistics (i.e. correlations or sufficient data to compute correlations).

### **2.2.3 Meta-analytic strategy**

The index of effect size used for analysis was the correlation coefficient reported between TPB variables (e.g. attitude and intention, intention and behaviour, etc.). Authors were contacted for further information where insufficient data was provided. A random-effects meta-analysis was performed for each relationship using the Comprehensive Meta-Analysis (version 3.0) computer software package. This resulted in ten independent analyses; the results of which are summarized in Table 2.4.

Three of the studies included in this review formed part of a longitudinal research project to assess pregnant women's exercise attitudes and behaviours which resulted in repeated measures being available for a number of participants represented in this meta-analysis (cf. Hausenblas & Symons Downs, 2004; Symons Downs & Hausenblas, 2003, 2007). However, as women's beliefs about exercise vary by trimester and PA decreases from the first, to the second, and to the third trimester (Hausenblas, Giacobbi, Cook, Rhodes, & Cruz, 2011), the results of the three studies in question were not combined but treated as independent data sets.

One doctoral study reported attitudes and behaviours over three trimesters separating results by motherhood status (cf. DiNallo, 2011). As the present analysis did not consider the effect of any potential moderators, the results for women with ( $n = 88$ ) and without ( $n = 78$ ) children were combined to produce a single value for each outcome per trimester ( $N = 166$ ). Consistent with our approach, the results for each trimester were treated as independent data sets.



#### **2.2.4 Publication bias**

It is typically assumed that published studies represent a biased sample of all studies conducted in the behavioural sciences (Rosenthal, 1979). Rosenthal's (1979) Fail-Safe N is one method that has previously been used as an assessment of the possible effects of publication bias in meta-analyses involving the TPB and exercise (see Hausenblas, Carron, & Mack, 1997, Symons Downs & Hausenblas, 2005a). Specifically, this method was used to determine how many missing studies are required before the summary effect would become non-significant (Borenstein et al., 2009). Potential publication bias in this review was assessed by Rosenthal's (1979) Fail-Safe N. These results are summarized in Table 2.4.

### **2.3 Results**

#### **2.3.1 Study selection**

An initial search of computer-based electronic databases identified 122 potentially relevant studies. A further 62 studies were obtained through additional searches and/or other sources. Once duplicates were removed 99 studies were screened for eligibility by title and abstract; 52 records were excluded at this point. A total of 47 studies were then assessed against the inclusion criteria by the first and third authors. Forty articles were excluded of which 13 did not involve a pregnant sample, 17 did not use the TPB as conceptual framework, 3 studies did not investigate exercise or physical activity as the target behaviour, 5 studies did not provide adequate statistical data and 1 study was not available in the English language. Finally, a total of 8 studies were selected for inclusion in the meta-analysis (see Figure 2.2 and Table 2.2).

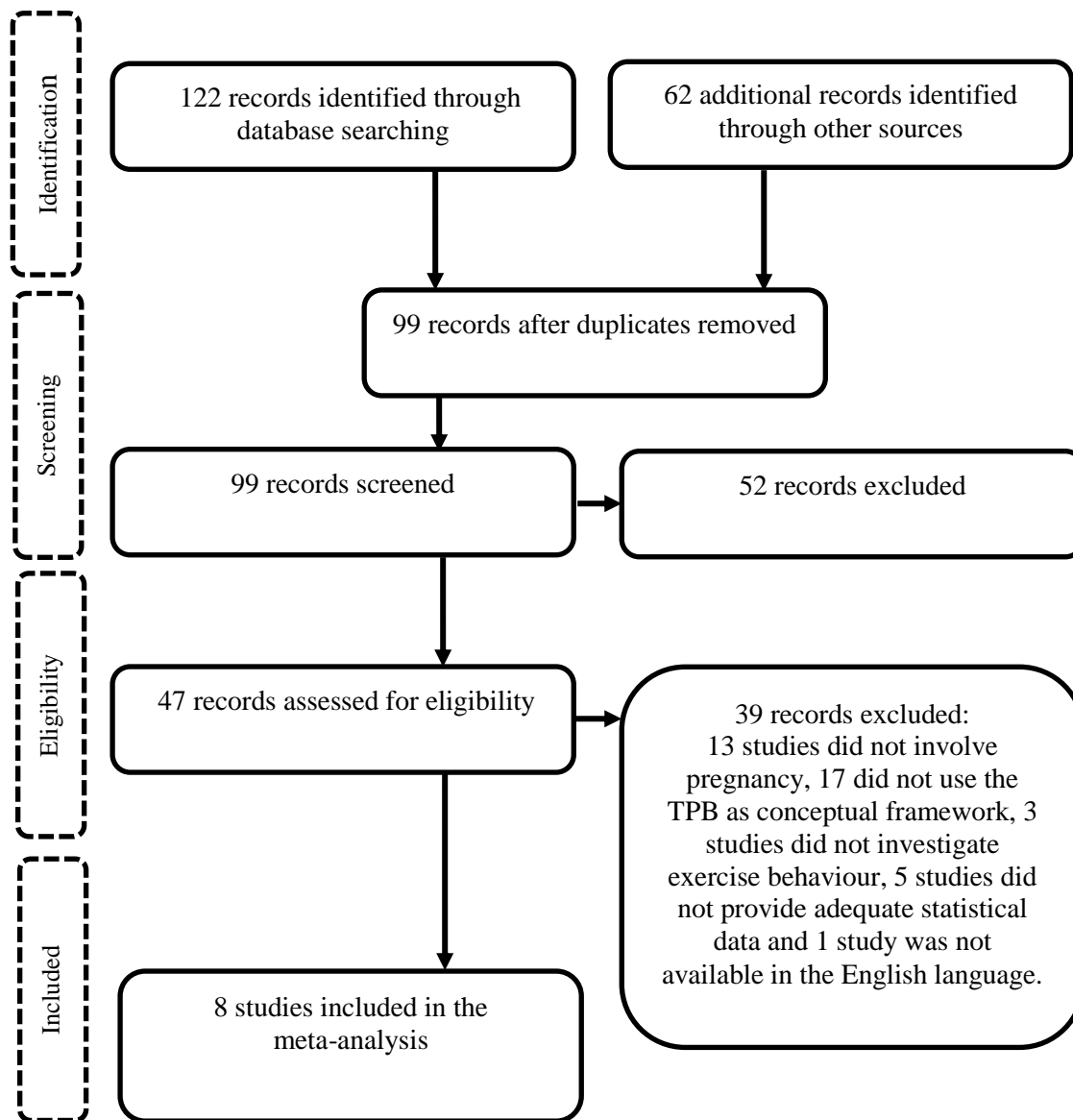


Figure 2.2: Flow diagram representing study selection (adapted from PRISMA, 2009).

Table 2.2: Characteristics of studies included in the meta-analysis.

<b>Study</b>	<b>Sample</b>	<b>Design</b>	<b>Elicitation Study</b>	<b>Measures</b>	<b>Major findings</b>
Hausenblas & Symons Downs (2004)	Participants: 104 women recruited from private physician's practice in their first trimester of pregnancy, Study location: Pennsylvania (USA). Remarks: most women were of middle to high socioeconomic status, well-educated and Caucasian.	Part of a larger longitudinal study assessing pregnant women's attitudes and behaviours during their first, second, and third trimesters.	Not mentioned.	Demographic questionnaire. Leisure-time Exercise Questionnaire (LTEQ). TPB measures: attitude, subjective norm, PBC, and intention.	Intention predicted exercise behaviour during the first trimester, however, when PBC was added to the regression model, it became the only significant predictor of exercise behaviour. Attitude was the strongest predictor of intention. Subjective norm was a significant predictor of intention. PBC did not predict exercise intention during the first trimester.
Symons Downs & Hausenblas (2003)	Participants: 89 pregnant women in their second trimester (recruited from private physician's practice in their first trimester). Study location: Pennsylvania (USA).	Part of a larger longitudinal study assessing pregnant women's attitudes and behaviours during their first, second, and third trimesters.	Yes, a pilot study was conducted with 77 postpartum women to retrospectively elicit their exercise beliefs.	Personal history questionnaire. TPB measures: attitude, subjective norm, PBC, intention and exercise behaviour.	Intention, but not PBC significantly predicted pregnant women's second trimester exercise behaviour. Attitude was the strongest determinant of intention; however, attitude was only slightly stronger in predicting intention than PBC. Subjective norm was a strong determinant of intention when

	Remarks: most women were of middle to high socioeconomic status, well-educated, and Caucasian.				it was combined with attitude; however, failed to maintain its unique contribution when it was also combined with PBC.
Symons Downs & Hausenblas (2007)	Participants: 62 pregnant women in their third trimester, (recruited from private physician's practice in their first trimester). Study location: Pennsylvania (USA). Remarks: most women were of middle to high socioeconomic status, well-educated and Caucasian.	Part of a larger longitudinal study assessing pregnant women's attitudes and behaviours during their first, second, and third trimesters.	Yes, a pilot study was conducted with 77 postpartum women to retrospectively elicit their exercise beliefs.	Personal history questionnaire. TPB measures: attitude, subjective norm, PBC, intention and exercise behaviour, behavioural beliefs, normative beliefs, control beliefs.	Intention and PBC explained 28% of the variance in third trimester exercise behaviour, with intention being the strongest determinant. Attitude and subjective norm explained 31% of the variance in exercise intention. Subjective norm was the strongest determinant of intention followed by attitude; PBC did not provide unique contribution. Women exercising in their third trimester had significantly lower postpartum BMI compared to women who did not exercise during their third trimester.
Supavititpatana et al. (2012)	Participants: 272 pregnant Thai women in their second trimester, recruited from one	Descriptive, cross-sectional design.	Yes, 7 focus groups involving 52 pregnant Thai women.	Demographic Data Questionnaire. TPB Questionnaire.	Women with more positive attitudes toward PA had higher intention to engage in PA behaviour compared to the women who had less positive attitudes toward PA.

	of two selected antenatal clinics. Study location: northern Thailand.				Subjective norm was the strongest determinant of PA intention.
Chung (2012)	Participants: 50 pregnant women in their first trimester, recruited from a community health program, Adopt-A-Mom. Study location: Guilford County, North Carolina (USA). Remarks: most women were Hispanic and of low socioeconomic status.	Descriptive, cross-sectional design.	No, based on previous research.	Demographic Questionnaire. TPB Measures: intention, attitude, subjective norm, and PBC [based on the items used by Hausenblas and Symons Downs (2004)]. Exercise behaviour: CDC leisure time PA item.	Only subjective norm was significantly correlated to exercise intention. Only PBC was significantly correlated to exercise behaviour.
Zamora-Flyr (2011)	Participants: 102 pregnant women in their second trimester, recruited from two clinics. Study location: San Diego, California (USA). Remarks: Hispanic women of low socioeconomic status either with (n	Descriptive, cross-sectional design.	Yes, 17 women participated in a focus group, and 8 participated in personal interviews.	TPB Measures: intention, attitude, subjective norm, PBC and moral obligation. Exercise behaviour: International Physical Activity Questionnaire (IPAQ) and pedometer during the second trimester and 4-6 weeks later during the third trimester.	The addition of moral obligation had no effect on intention nor was it found to be an independent predictor. Intention was a significant predictor of walking during the second trimester at baseline. The most important determinant of walking (exercise behaviour) during the third trimester was

	= 40) or without (n = 62) GDM.				walking (exercise behaviour) during the second trimester; intention made no independent contribution to past behaviour when included to predict future behaviour.
Black et al. (2007)	Participants: 98 pregnant women, recruited from the Healthy Mothers on the Move project (Healthy MOMs). Study location: Southwest Detroit, Michigan (USA). Remarks: Latina women of low socioeconomic status.	Descriptive, cross-sectional design.	Yes, focus groups were conducted with the target population according to guidelines for using the TPB.	Healthy MOMs baseline questionnaire including: behavioural beliefs, subjective norm, control beliefs, and intention with regard to regular, moderate exercise during pregnancy.	Behavioural and control beliefs predicted Latina women's intention to engage in regular exercise during pregnancy. Subjective norm and physical benefits were not associated with intention.
DiNallo (2011)	Participants: 166 women recruited from private physician's practice in their first trimester of pregnancy, Study location: Pennsylvania (USA). Remarks: most women were of	Pregnant women were recruited for this study as part of a larger longitudinal study examining women's pregnancy exercise beliefs and behaviours during their first, second, and third	No, based on previous research.	Motherhood status. TPB measures: TPB measures: attitude, subjective norm, PBC, intention and exercise behaviour. Socio-Demographic Variables. Pre-pregnancy Weight Status. Depressive Symptoms.	There were no motherhood status differences in the changes in attitude, subjective norm, PBC, intention, or exercise behaviour from the first to the second or the second to the third trimesters. For all participants, attitude, subjective norm, and PBC increased from the first to the second trimester, while all constructs significantly

	middle to high socioeconomic status and Caucasian.	trimesters – the study produced three independent data sets included in this meta-analysis.			decreased from the second to the third trimester. Motherhood status moderated the PBC-intention and PBC-behaviour associations. Second trimester intention emerged as the only predictor of third trimester exercise behaviour.
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### **2.3.2 Sample characteristics**

All but one of the studies included in the analysis were carried out in the United States with participant numbers ranging from 50 to 272. The majority of participants were recruited in their first or second trimester of pregnancy; in only one study were women recruited during the third trimester. The majority of women were between 18 and 43 years of age with mean age being reported in all but one of the studies. Where behaviour was measured, this was done mainly by self-report measures including the Leisure Time Exercise Questionnaire and the International Physical Activity Questionnaire. Only one study used an objective measurement (i.e. pedometer) of exercise behaviour. Psychometric properties of the measures used to investigate TPB constructs were stated in all of the studies although in one report this was described as a range rather than specified per outcome. All studies included demographic statistics on ethnicity, education levels and socio-economic status with 86% reporting marital status and 86% describing the occupation and/or employment status of participants.

### **2.3.3 Heterogeneity**

Using Cochran's Q-test the null hypothesis that all studies within each of the meta-analyses share a common effect size was examined (Borenstein et al., 2009). The results indicate that the true effects vary ( $p < .10$ ) for all but one of the summary effects resulting in the null hypothesis being rejected for the majority of outcomes assessed within this paper (see Table 2.3). For these effects the proportion of variance across studies that is due to heterogeneity ( $I^2$ ) ranges from 71.81% to 92.75%. As heterogeneity affects the precision of the mean effect size, the reader is urged to consider the confidence intervals and standard deviation of the effect size (T; i.e. dispersion) alongside the overall effect (Borenstein et al., 2009). It should be noted, however, that a random-effects model allows true effect sizes to vary between studies and



addresses the issue of heterogeneity by using the estimation of true variance in effects ( $T^2$ ) to assign weights to each study in the meta-analysis (Borenstein et al., 2009).

Table 2.3: Indices of heterogeneity.

Outcome (or relationship)	Q-value	Degrees of freedom (df)	p-value (significant at 0.10)	I squared ( $I^2$ )	Tau squared ( $T^2$ )	Tau ( $T$ )
Behaviour & Intention	38.48	7	0.000	81.81	0.04	0.20
Behaviour & Attitude	24.83	7	0.001	71.81	0.02	0.15
Behaviour & Subjective norm	6.24	7	0.512	0.00	0.00	0.00
Behaviour & PBC	46.99	7	0.000	85.10	0.05	0.23
Intention & Attitude	110.29	8	0.000	92.75	0.10	0.32
Intention & Subjective norm	64.83	9	0.000	86.12	0.05	0.23
Intention & PBC	77.72	8	0.000	89.71	0.07	0.27
Attitude & Subjective norm	51.01	8	0.000	84.32	0.04	0.21
Attitude & PBC	39.14	8	0.000	79.56	0.03	0.18
Subjective norm & PBC	55.08	8	0.000	85.48	0.05	0.22

### 2.3.4 Sensitivity analyses

Sensitivity analyses were conducted to investigate the robustness of the reported findings, risk of bias, and the possible reason for heterogeneity (Borenstein et al., 2009). Firstly, it was found that no single study dominated any of the analyses. Secondly, the standardized residuals were inspected to determine if any of the studies were outliers. A study that did not fall within two

standard deviations of the mean (i.e. the 95% confidence interval or  $p = .05$ ) was found in nine of the ten analyses. The data was subsequently examined to see if the summary effect would change had any one of these potential outliers been excluded. The summary effect remained significant ( $p < .001$ ) in each of these cases and all studies were therefore included in the final analysis.

### 2.3.5 Summary results

The primary purpose of this study was to examine the efficacy of the TPB in explaining exercise intention and behaviour in pregnant women. The findings (see Table 2.4) confirm the existence of a strong relationship between intention and behaviour ( $r = .50$ ,  $p < .05$ ,  $T = .20$ ,  $R^2 = 25.00$ ; see Figure 2.3) and medium relationship between PBC and behaviour ( $r = .38$ ,  $p < .05$ ,  $T = .23$ ,  $R^2 = 14.44$ ; see Figure 2.4; cf. Cohen, 1988).

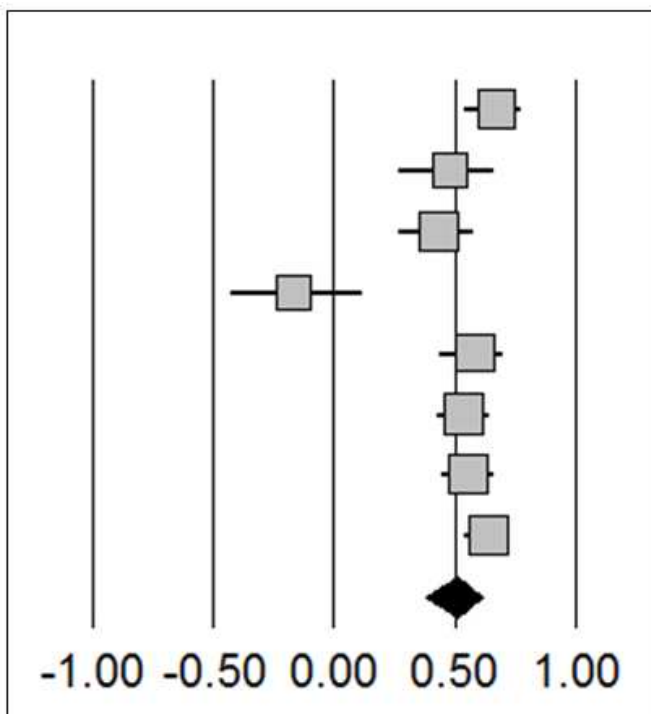


Figure 2.3: Relationship (r) between exercise intention and behaviour in pregnant women.

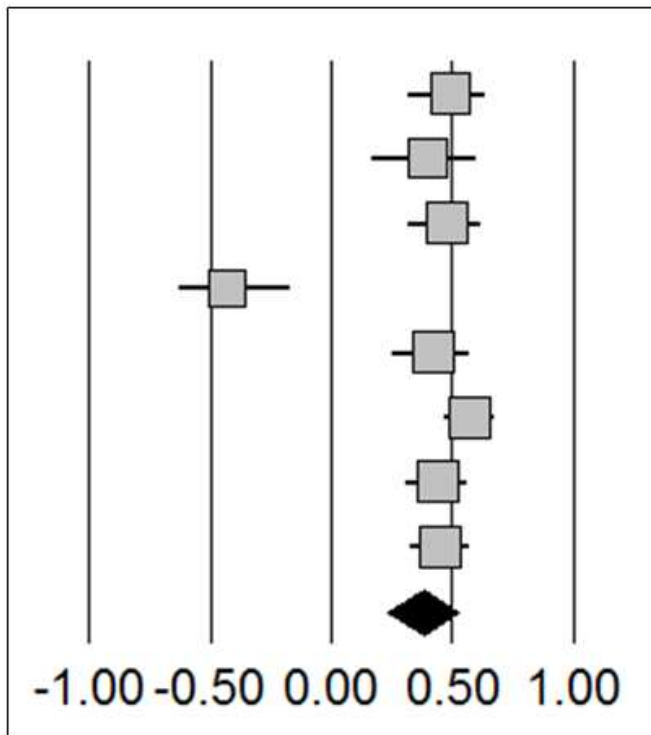


Figure 2.4: Relationship (r) between PBC and exercise behaviour in pregnant women.

As hypothesized, results showed that women's attitude ( $r = .59$ ,  $p < .05$ ,  $T = .32$ ,  $R^2 = 34.81$ ; see Figure 2.5) towards exercise had the strongest association with their intention to be physically active during their pregnancy. However, both PBC ( $r = .58$ ,  $p < .05$ ,  $T = .27$ ,  $R^2 = 33.64$ ) and subjective norm ( $r = .50$ ,  $p = .0000$ ,  $T = .23$ ,  $R^2 = 25.00$ ) showed strong relationships with intention (cf. Cohen, 1988).

The relationships among the remaining constructs of the TPB were also examined. All correlations were significant at an alpha level of .05 two-tailed. The strongest relationships were reported between attitude and PBC ( $r = .60$ ,  $p < .05$ ,  $T = .17$ ,  $R^2 = 36.00$ ) and attitude and subjective norm ( $r = .60$ ,  $p < .05$ ,  $T = .21$ ,  $R^2 = 36.00$ ). The weakest relationship in this examination of the TPB was found between attitude and behaviour ( $r = .33$ ,  $p < .05$ ,  $T = .15$ ,  $R^2 = 10.89$ ).

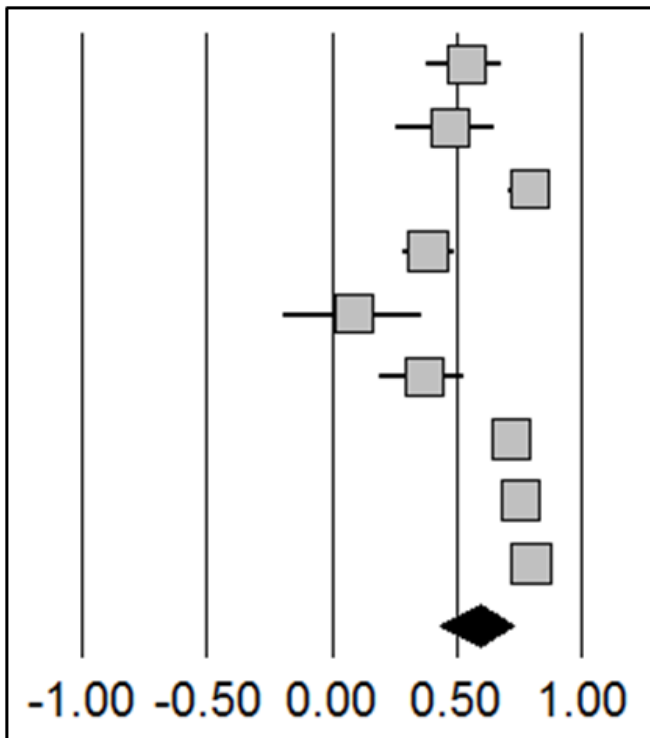


Figure 2.5: Relationship ( $r$ ) between attitude and exercise intention in pregnant women.

Since inferences with regards to causation between variables cannot be made, it would have been useful to assess the construct validity and predictive utility of the TPB by means of regression or path analysis. Using G\*Power version 3.1.7 (Faul, Erdfelder, Buchner, & Lang, 2009) and based on a large effect size, a power of 80% and an alpha level of .05 two-tailed, it is estimated that approximately 40 effect sizes will be required to permit multiple regression analysis. However, as only 8 effect sizes were available resulting in insufficient power, it was not possible to carry out further analyses (see Table 2.5).

Table 2.4: Summary of results.

<b>Outcome</b>	<b>Correlation*</b>	<b>p-value (significant at 0.05)</b>	<b>95% Confidence Interval</b>	<b>Rosenthal's Fail- safe N</b>
Behaviour & Intention	0.50	0.000	0.38 to 0.61	565
Behaviour & Attitude	0.33	0.000	0.21 to 0.44	211
Behaviour & Subjective Norm	0.35	0.000	0.29 to 0.40	212
Behaviour & PBC	0.38	0.000	0.23 to 0.52	319
Intention & Attitude	0.59	0.000	0.43 to 0.72	1243
Intention & Subjective Norm	0.50	0.000	0.38 to 0.61	936
Intention & PBC	0.58	0.000	0.44 to 0.69	1183
Attitude & Subjective Norm	0.60	0.000	0.49 to 0.68	1218
Attitude & PBC	0.60	0.000	0.51 to 0.68	1253
Subjective Norm & PBC	0.50	0.000	0.37 to 0.61	760

\*The values .10, .30, and .50 correspond to small, medium and large effect sizes (Cohen, 1988).

Table 2.5: Summary of the number of effect sizes and cases available for analyses.

Number of cases Number of correlates	Attitude	Subjective Norm	PBC	Intention	Behaviour
Attitude		1177	1177	1177	905
Subjective Norm	9		1177	1275	905
PBC	9	9		1177	905
Intention	9	10	9		905
Behaviour	8	8	8	8	

## 2.4 Discussion

In relation to the two main objectives of this review it was found that attitude had the strongest association with intention whilst intention had the strongest correlation with exercise behaviour. These results compare favourably with that of previous narrative and statistical reviews of the TPB and exercise-related studies (see Blue, 1995; Hausenblas, Carron, & Mack, 1997; Hagger, Chatzisarantis, & Biddle, 2002; Symons Downs & Hausenblas, 2005a). A few interesting findings with reference to understanding physical activity intention and behaviour in the pregnant population, however, stand out.

As hypothesized, results of the present study confirm a strong relationship between pregnant women's intentions and exercise behaviour. Ajzen (1991), however, argues that these intentions can only translate into action if the behaviour of interest is under complete volitional control. Whilst this requirement is met by some physical activity behaviours, regularly

engaging in exercise during pregnancy may be affected by both general issues (e.g. time, finance, childcare, knowledge, etc.) and pregnancy specific factors such as morning sickness during the first trimester or physical discomfort during the third trimester. Combined, these factors represent pregnant women's actual control over exercise behaviour. Thus, within the context of the TPB, pregnant women's perception of the availability of adequate resources and opportunities coupled with fewer anticipated barriers should result in greater perceived control over exercise behaviour. However, results indicate that PBC only had a moderate relationship with women's exercise behaviour during pregnancy thereby suggesting that expectant mothers are unsure about their ability to participate in physical activities during pregnancy.

Thus, although there is a strong relationship between exercise intention and behaviour in the pregnant population, a lack of actual control over non-motivational factors can reduce the predictive validity of intentions (Ajzen, 2011). This weakened relationship together with the theoretical assumption that both PBC and intention can predict behaviour; could potentially explain why behavioural attainment in terms of physical activity is low in the pregnant population. Enhancing pregnant women's sense of control seems to be one method of improving the uptake and maintenance of exercise during pregnancy (i.e. overcome the intention-behaviour gap).

Whilst it was not possible to do an analysis by trimester (i.e. subgroup analysis), it is important to recognise that the physical and psychological demands of pregnancy vary between trimesters and that several factors can influence the exercise intentions and behaviours of expectant mothers (Symons Downs & Hausenblas, 2007). It may be that different types of interventions are required for each trimester and future research should aim to differentiate between the findings in each trimester and to compare these changes over the course of a pregnancy.

In contrast to the findings of a previous meta-analysis in the exercise domain where subjective norm did not predict intentions (Symons Downs & Hausenblas, 2005a); this study showed support for its inclusion in the TPB to investigate exercise intentions and behaviour in a pregnant population. Specifically, subjective norm showed a comparable moderate association with behaviour than attitude and PBC. Similar to attitude and PBC, subjective norm also revealed a strong relationship with intention. The perceived social pressure to conform to other people's opinion whether or not to participate in physical activity during pregnancy may well be an important consideration for expectant mothers. This is not entirely surprising as pregnancy is associated with significant changes that may leave pregnant women feeling vulnerable and seeking the support and approval of those who are most important to them. This finding may thus present with an opportunity for intervention and further research. Firstly, it is generally accepted that health professionals play an important role in the dissemination of pregnancy related information, however, research shows that pregnant women are offered little or no physical activity advice or have to request it (Olander, Atkinson, Edmunds, & French, 2011; Ferrari, Siega-Riz, Evenson, Moos, & Carrier, 2013). In developing pregnancy advice and interventions, barriers to providing effective guidance should be investigated from the health professionals' point of view (Phelan, 2010). For example, in a recent review, Heslehurst et al. (2014) found that whilst healthcare providers were confident in providing general physical activity advice they were also of opinion that there was a lack in accessible opportunities and services to support such guidance. Secondly, it may also be important to include a pregnant women's partner or even a relative or close friend in any intervention aimed at increasing and maintaining physical activity during pregnancy as the information provided about exercise "has to compete with that delivered on other subjects, as well as with advice women may seek or receive from other sources, as well as with social and psychological factors" (Gross & Bee, 2004, p. 168).



Given its unique contribution in this study, the notion that subjective norm should be excluded from the TPB cannot be supported. However, the fact that research has suggested social support to be superior to subjective norm in explaining exercise intentions has to be acknowledged (Rhodes, Jones, & Courneya, 2002). Therefore, instead of removing and/or replacing the construct, social norm and social support should be combined which may, in turn, strengthen the normative component of the TPB. Future research should (a) consider the impact of assistance provided by others to promote physical activity initiation and maintenance during pregnancy and (b) examine whether construct validity and reliability can be achieved when combining these two determinants and whether this conceptualisation is more effective in explaining the exercise intentions and behaviours of expectant mothers.

The final objective of this review was to quantify the relationships between all the remaining constructs within the TPB. Intention to exercise during pregnancy was influenced primarily by women's beliefs about the positive and negative consequences of doing so. However, attitude also shared strong correlations with both PBC and subjective norm. This suggests that these variables share some aspects which are interrelated. It could thus be argued that a pregnant woman may evaluate exercise as a positive experience if she perceives it to be a manageable task. Also, she may view exercise as more favourable when her perception of physical activity during pregnancy matches that of important others.

Although the results of this study have been supportive of the TPB, it is important to acknowledge that the theory has not been without criticism. Firstly, there is a lack of consistency in defining and measuring the constructs within the TPB. This is particularly true for PBC (Biddle & Mutrie, 2008). Whilst PBC is said to reflect Bandura's (1977) concept of self-efficacy, some studies have shown self-efficacy to make independent contributions to the

intention-behaviour relationship (Armitage & Conner, 1999; Hagger et al., 2002; Terry & O’Leary, 1995). However, Fishbein and Ajzen (2010) argue that separating items directly measuring PBC into factors “identifying them as self-efficacy expectations and perceived control is misleading and unjustified” (p. 165) as “theoretically, both items refer to the same latent construct, namely, the perceived ability to perform a given behaviour or to carry out a certain course of action” (p. 166). They propose that instead these should be classed into the categories of perceived capacity (i.e. perceived ease or difficulty) and perceived autonomy (i.e. perceived control) that combine to form a single PBC construct with discriminant validity and high internal consistency. It should be noted, however, that the validity established for items measuring a specific behaviour may not necessarily apply to other behaviours (Fishbein & Ajzen, 2010). For example, Courneya, Bobick, and Schinke (1999) found items referring to perceived ease or difficulty of participating in regular exercise to be a good indicator of overall PBC; whilst Kraft, Rise, Sutton, and Roysamb (2005) found that the perceived ease or difficulty of recycling behaviour was reflected in both self-efficacy and the affective dimension of attitude. None of the studies included in this review made a distinction between self-efficacy and PBC with internal consistency values ranging from .81 to .91. This suggests that the direct measurement of PBC is a valid method for examining exercise intentions and behaviour in pregnant women.

Secondly, although the TPB is considered a flexible framework into which other variables can be incorporated, the inclusion of past behaviour as an additional predictor variable has been consistently reported to account for a further variance on intentions of approximately 10% (Fishbein & Ajzen, 2010). In a meta-analysis of 72 studies within a physical activity context, Hagger and colleagues (2002) found frequency of past behaviour to be related to all TPB variables. This suggests that studies not considering past behaviour may be obtaining inflated

correlations due to the residual effect of past behaviour on the TPB constructs (Biddle & Mutrie, 2008; Fishbein & Ajzen, 2010). Although some researchers have chosen to control for its influence, it is possible that past behaviour may have a direct, causal effect on intentions and/or actual behaviour thereby suggesting past behaviour as an additional variable in its own right (Fishbein & Ajzen, 2010).

Few studies have considered the effects of past behaviour during pregnancy using the TPB. In her doctoral dissertation, Zamora-Flyr (2010) used a modified version of the TPB that included moral obligation to predict walking behaviour in a sample of pregnant Hispanic women (N = 102). The author did not find moral obligation to make an independent contribution to intentions, however, walking behaviour during the second trimester successfully predicted walking behaviour during the third trimester. This study thus offers further support for the inclusion of past behaviour as an additional variable to the TPB. In contrast to Zamora-Flyr's (2010) findings, Hausenblas, Symons Downs, Giacobbi, Tuccitto and Cook (2008) did not find pre-pregnancy exercise participation to moderate the effect of the TPB variables on exercise intention nor did it predict pregnancy exercise behaviour. However, it should be noted that these two examinations of past behaviour vary in the sense that Zamora-Flyr (2010) predicted exercise behaviour during pregnancy (i.e. second to third trimester) using objective measurements (i.e. a pedometer) whilst Hausenblas and colleagues (2008) predicted exercise behaviour during pregnancy based on subjective measurements (i.e. Leisure-Time Exercise Questionnaire) of behaviour prior to pregnancy which varied from the measurement of behaviour during pregnancy (i.e. a behaviour statement). More research using measurements suitable to both pre-pregnancy and pregnancy exercise behaviour is warranted before conclusions can be drawn about the effect of pre-pregnancy physical activity participation and exercise intentions and behaviour during pregnancy.

Finally, whilst it was possible to quantify the magnitude of the linear relationships between theoretical constructs within the TPB, the effects of any additional or moderator variables were not considered. For example, it would have been useful to compare studies based on (a) the time interval between assessing intention and behaviour, (b) whether scale correspondence was achieved between the measurement of intention and behaviour, (c) background factors (e.g. ethnicity, socio-economic status, education, gravida, parental status, high risk pregnancies, etc.), and (d) the outcomes of published versus unpublished research.

## **2.5 Conclusion**

“The behaviours people perform in their daily lives can have profound effects on their own health and well-being, on the health and well-being of other individuals, groups, and organizations to which they belong, and on society at large” (Fishbein & Ajzen, 2010, p. 1). Understanding and explaining the reasons for human behaviour, however, is a complex undertaking (Ajzen, 1991). Whilst Sniehotta, Penseau and Araújo-Soares (2014) have suggested that the TPB has lost its utility, this study supports it as a relevant conceptual framework for the examination of physical activity intentions and behaviours in a pregnant population. Specifically, this meta-analysis has summarized the state of our current knowledge of pregnancy and physical activity related studies utilizing the TPB and in doing so identified areas for future research and key themes in the development of interventions aimed at increasing or maintaining exercise behaviour during pregnancy.

## Chapter 3: Methodology

### 3.1 Research design

Multiphase research designs involve the investigation of a research problem through a series of connected studies (Creswell & Plano Clark, 2011). These studies may utilize qualitative or quantitative methods to address a specific set of research questions whilst simultaneously advancing an overarching research objective (Creswell & Plano Clark, 2011). In the context of the current research project, three studies were implemented in phases (see Figure 3.1). In the first instance, the TPB provided a framework with the requirement to collect both qualitative (Study One) and quantitative (Study Two) data. A further qualitative study (Study Three) was included to gain additional insight into the behavioural phenomena under investigation. A sequential approach was used to recruit pregnant women as participants in Study One and Study Two. Midwives were recruited for Study Three concurrent with the recruitment of participants for Study Two.

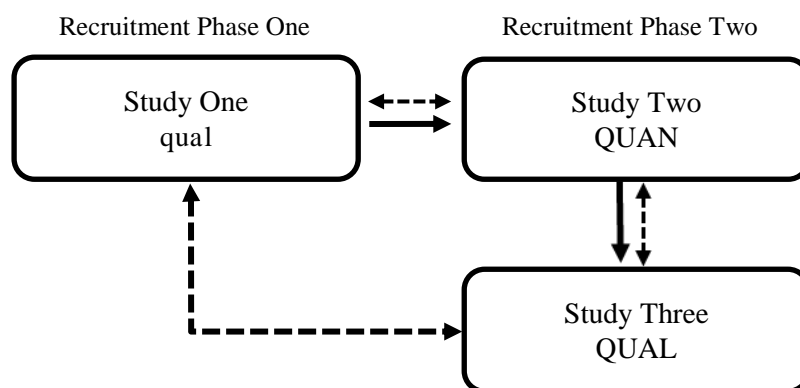


Figure 3.1: Schematic representation of multiphase research design (adapted from Creswell & Clark, 2011).

### **3.1.1 Research questions**

Cresswell and Plano Clark (2011) advocate that research questions need to be stated for each phase within a multiphase design as they “both contribute to the overall program of inquiry and build upon what has been learned in previous phases” (p. 101). In response to the dynamic nature of mixed methods research, and a multiphase research design in particular, it should also be noted that the research questions were reviewed and refined as the project progressed.

#### **Study One:**

1. Which salient beliefs do women hold in terms of the behavioural outcomes of physical activity during pregnancy?
2. Which salient beliefs do women hold in terms of the injunctive norms and descriptive referents of physical activity during pregnancy?
3. Which salient beliefs do women hold in terms of the control factors of physical activity during pregnancy?

#### **Study Two:**

1. Concerning the original TPB, which determinant will be the strongest predictor of pregnant women’s (a) exercise intention and (b) exercise behaviour?
2. When controlling for past behaviour, which determinant will be the strongest predictor of pregnant women’s (a) exercise intention and (b) exercise behaviour?
3. When adding past behaviour as additional variable, which determinant will be the strongest predictor of pregnant women’s (a) exercise intention and (b) exercise behaviour?

### **Study Three:**

1. What are midwives perceived roles and responsibilities in providing exercise advice and guidance to pregnant women?
2. What are the barriers perceived by midwives in providing effective exercise advice and guidance to pregnant women?
3. Do midwives perceive any opportunities in changing pregnant women's exercise behaviour?

#### **3.1.2 Research overview**

Study One involved an elicitation study where women at differing stages of pregnancy were asked to complete a questionnaire using open-ended questions to describe their beliefs about exercise during pregnancy. Pregnant women were recruited when attending an antenatal appointment at one of ten randomly selected NHS antenatal clinics within East Kent. Following content analysis, a first draft of the TPB questionnaire to be used during Study Two was developed. All participants were then asked to complete (i.e. pilot) the newly developed questionnaire and to provide feedback regarding wording, clarity, layout, time it took to complete, etc.

Pregnant women were recruited for Study Two when attending an antenatal appointment at one of ten newly randomly selected NHS antenatal clinics within East Kent. Participants were required to complete the developed TPB questionnaire and the Pregnancy Physical Activity Questionnaire (PPAQ) on two separate occasions at least two weeks apart. Quantitative data was gathered from the cross-sectional study regarding pregnant women's physical activity intentions (including attitude, subjective norm, and perceptions of control) and behaviours.

Concurrent with the recruitment of pregnant women for Study Two, midwives were recruited from the same randomly selected NHS antenatal clinics to participate in semi-structured interviews. The interview schedule was informed by literature and the findings from Study One and then tested in a pilot interview. Qualitative data was gathered from the study based on midwives' perceptions and practises with regards to providing physical activity advice and guidance during pregnancy.

### **3.1.3 Research governance**

Although various alternative recruitment avenues were considered (e.g. online forums, social media, newspaper advertisements, leaflets, posters, antenatal classes, National Childbirth Trust, etc.), the strategy adopted in this project was ultimately determined by the research governance process. Specifically, as the project involved pregnant women who were perceived as a vulnerable population, the matter was referred to the NHS Research Management and Governance Consortium for Kent and Medway. The presiding recommendation was that a favourable opinion from a NRES Committee would be prudent (P. Dodds, personal communication, January 10, 2013). In addition, as the study involved both pregnant women and the NHS staff involved in their care, a recruitment procedure that ensured the representation of both groups was employed. This connection was secured through the concurrent recruitment of participants from the same randomly selected antenatal clinics which also served the purpose of minimizing potential validity threats when combining data in multiphase designs.

Ethical approval to conduct the research was subsequently granted by the NRES Committee of London - Camberwell St. Giles (reference number: 13/LO/1397; see Appendix A) and permission to carry out the study was provided by the East Kent Hospitals University NHS



Foundation Trust (EKHUFT; reference number: 2013/WOMHE/01; see Appendix B and C). Participation in this project was voluntary and participants could choose to withdraw from the study at any point without their care being affected. Following their participation, pregnant women and midwives were offered the choice of receiving a high-street shopping voucher or for an equivalent donation to be made on their behalf to the charity Tommy's (see Appendix D).

### **3.2 Contextual environment**

Pragmatists are viewed as “everyday problem solvers” concerned with understanding phenomena within the context of the research environment they are engaged with (Tashakkori & Teddlie, 2010, p. 275). As such, a pragmatist would not make claims that discount or reject the role of contextual factors on human experience (Giacobbi et al., 2005). With pragmatism central to the research project, it is necessary to acknowledge the context within which the study occurred.

Participants for this research project were recruited from NHS antenatal clinics within the geographical area of East Kent<sup>2</sup>. The East Kent region is located within the county of Kent in the South East of England. East Kent comprise the city of Canterbury and the towns of Ashford, Dover, Folkestone, and Margate. The region has an estimated population of nearly 800,000 people of which 95% are of white ethnicity and 51% are female. English is the main language in the majority of households (95%). Nearly half of the adult population (16 years and older) are married or in a registered same-sex civil partnership (47%). In two thirds (66%) of households, the occupied property is owned outright or with a mortgage or loan. Although

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<sup>2</sup> Regional statistics extracted from Kent County Council (2016).

most of the adult population between the ages of 16 and 74 are economically active (67%), males (73%) are more so than females (62%). Of the males who are employed, 84% are in full-time employment and 16% in part-time employment. In comparison, 52% of females are in full-time employment and 48% in part-time employment. The three main industries providing employment in the region are: (1) wholesale and retail trade, repair of motor vehicles and motor cycles (16%); (2) human health and social work activities (14%); and (3) education (11%). Most people living in East Kent describe themselves as being in either good health (35%) or very good health (44%).

During 2013-14 there were a total of 646,904 babies born in England of which 6,711 deliveries were reported by the EKHUFT<sup>3</sup>. The person overseeing the delivery was known in 6,538 of these cases, that is, 39% of the deliveries were conducted by a hospital doctor and 61% were led by a midwife. In a quarter of these cases (1,614) the mode of delivery was caesarean. There were 234 full-time equivalent registered midwives employed with the EKHUFT during September 2014. A total of 96,379 midwifery appointments were scheduled of which 90% were attended.

### **3.3 The third methodological movement**

When confronted with multidimensional social and behavioural phenomena, mixed method researchers combine, integrate, or mix quantitative and qualitative methods to best address a specific problem or phenomena of interest (Tashakkori & Teddlie, 2010; Creswell & Plano Clark, 2011). Mixed methods research, therefore, does not propose to replace either quantitative or qualitative research approaches “but rather to draw from the strengths and

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<sup>3</sup> Regional statistics extracted from Health and Social Care Information Centre (2015).

minimize the weakness of both” (Johnson & Onwuegbuzie, 2004, p.14). For example, when only a few individuals participate in a qualitative study, the ability to generalise findings to the wider population is compromised, but then, when many individuals participate in a quantitative study, detailed descriptions of individual accounts are lacking (Creswell & Plano Clark, 2011). The main difference between quantitative and qualitative research is, however, not along the “exploratory-confirmatory or inductive-deductive dimensions” but rather the underlying philosophical assumptions on which they are based (Atieno, 2009, p. 14; see Table 3.1). Quantitative purists embrace assumptions synonymous with a positivist philosophy (i.e. realist ontology and objective epistemology) whereas qualitative purists argue for the superiority of a constructivist philosophy (i.e. relativist ontology and subjective epistemology; Johnson & Onwuegbuzie, 2004).

Table 3.1: Comparison of main philosophical foundations (adapted from Creswell & Plano Clark, 2011).

<b>Quantitative approach</b>	<b>Element</b>	<b>Qualitative approach</b>
Realism (singular reality)	<b>Ontology</b> (nature of reality)	Relativism (multiple realities)
Objective	<b>Epistemology</b> (nature of knowledge)	Subjective
Unbiased	<b>Axiology</b> (role of values)	Biased
Deductive	<b>Methodology</b> (process of research)	Inductive
Postpositivism	<b>Paradigm</b> (worldview)	Constructivism

Whilst in the past it was suggested that quantitative and qualitative methods could not be mixed because of the incompatibility of the paradigms on which they are based, pragmatism have bridged the gap and emerged as the primary philosophy guiding ways of understanding and thinking in mixed methods research (Alise & Teddlie, 2010; Johnson, Onwuegbuzie, & Turner,

2007; Creswell & Plano Clark, 2011). A pragmatic worldview rejects dichotomous choices between either quantitative or qualitative approaches in favour of a continuum of options that ranges from the experimental to the discursive and from the empiricist to the theoretical (Tashakkori & Teddlie, 2010; Frost, 2016). This is viewed as a “balanced or plurist position” (Johnson & Onwuegbuzie, 2004, p.16) which “sidesteps the contentious issues of truth and reality, accepts philosophically, that there are singular and multiple realities that are open to empirical inquiry and orients itself toward solving problems in the ‘real world” (Feilzer, 2010; p. 8). Ultimately, the phenomena being investigated together with the associated research questions are deemed of greater importance than the underlying philosophical assumptions of the chosen method (Giacobbi, Poczwardowski, & Hager, 2005). Morgan (2007) proposes pragmatism as an effective alternative to quantitative and qualitative approaches through the processes of abduction, intersubjectivity, and transferability. Here, the author refers to abductive reasoning as the freedom of the researcher to move back and forth between induction and deduction; intersubjectivity suggests movement between objective and subjective frames of reference; and transferability refers to the extent to which knowledge gained can be transferred to other settings or circumstances as opposed to being either specific and context-dependent or universal and generalized. Thus, by embracing an eclectic research approach, pragmatists recognise differences and similarities between approaches and acknowledge “the value of both quantitative and qualitative research methods and the knowledge produced by such research furthering our understanding of society and social life” (Feilzer, 2010, p. 14).

### **3.4 Research quality**

Validity in mixed methods research is said to be “a function of both design quality and interpretive rigor” (Teddlie & Tashakkori, 2003, p. 40). However, discussions around the issue

of validity are yet to reach a consensus regarding the language and framework of quality assessment to be used (O’Cathain, 2010). Firstly, the term validity is typically associated with a quantitative approach and has therefore been disputed by some mixed methods scholars with “inference quality” (Teddlie & Tashakkori, 2003, p. 40) and “legitimation” (Onwuegbuzie & Johnson, 2006, p. 55) proposed as alternative terms. Secondly, there is variation in the quality assessment frameworks proposed by leading authors. For example, Onwuegbuzie and Johnson (2006) propose a typology consisting of nine legitimation types (or issues not associated with single method designs), whereas O’Cathain (2010) propose a framework comprising eight domains of quality based upon a review of approaches adopted in previous mixed method research. However, such comprehensive frameworks are “time consuming and difficult” to apply and it is therefore suggested that researchers identify or prioritise the criteria most relevant to their investigation (O’Cathain, 2010, p. 552).

### **3.4.1 Quality in traditional research approaches**

In the first instance this implies individually addressing the quality criteria associated with the qualitative and quantitative strands of the investigation (Creswell & Plano Clark, 2011). Ways to determine quality in quantitative research approaches involve addressing the issues of validity, reliability, generalisability, and objectivity (Sparkes & Smith, 2014). Parallel to this, in qualitative research trustworthiness is assessed through the criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985; see Table 3.2).

Table 3.2: Comparison of quality assessment criteria

<b>Quantitative Research</b>	<b>Qualitative Research</b>
Internal validity (e.g. randomization)	Credibility (e.g. member checking)
External validity (or generalisability) (e.g. random selection)	Transferability (e.g. thick description)
Reliability (e.g. internal consistency)	Dependability (e.g. audit trail)
Objectivity (e.g. interrater agreement)	Confirmability (e.g. reflexivity)

### Internal validity and credibility

Internal validity is defined as “the extent to which the results can be attributed to the treatments used in the study” thereby implying that it would be necessary to control all the factors (or threats) that could potentially influence the study outcome (Thomas & Nelson, 2001, p. 13). From a quantitative perspective, internal validity is typically associated with experimental research designs concerned with establishing cause-and-effect relationships, thus, controlling threats to internal validity can in most cases be achieved through the random assignment of participants to experimental and control groups thereby ensuring that groups are comparable (Thomas & Nelson, 2001; Creswell & Plano Clark, 2011). However, the quantitative study presented in this thesis as Study Two did not involve an experimental design and threats to internal validity was assessed by comparing sample characteristics across the TPB constructs through a multivariate analysis of variance (MANOVA).

Lincoln and Guba (1985) suggest credibility as a criterion of assessing qualitative research that is parallel to that of internal validity. Credibility involves employing techniques that enable researchers to match the “constructed realities of respondents” with those realities represented by the researcher (Sparkes & Smith, 2014, p. 189). Several of these techniques were adopted

in both Study One and Study Three of this project. For example, Study One involved a content analysis of participants' responses which were then developed into a questionnaire that was implemented during Study Two. The first draft of the questionnaire was sent back to the participants who contributed to its development and they were asked to provide feedback about it (i.e. member checking). These elicited beliefs were also found to be representative of the study population through correlation of the belief indices with direct measures of the TPB (i.e. methods triangulation). In addition, the modal salient beliefs identified were discussed with the researcher's supervisory panel, midwifery team leaders, and presented at a sport and exercise psychology conference (i.e. peer debriefing). Study Three of this project involved semi-structured interviews which were transcribed verbatim and were then made available to the midwives who participated for further comment and with the opportunity to elaborate on or clarify any of the issues raised (i.e. member checking). The themes identified were then considered in relation to the findings of Study One and Study Two and were discussed in the context of the National Maternity Review (2016; i.e. methods and source triangulation). Finally, the findings were presented to and discussed with the researcher's supervisory panel (i.e. peer debriefing).

#### External validity and transferability

External validity refers to the generalizability of findings to a larger population and can usually be achieved through random sampling procedures (Thomas & Nelson, 2001). The randomization procedure for this project involved the random selection of antenatal clinics from which participants were recruited. Sixty-two sites across East Kent were identified and notified in writing that ethical approval and permission to carry out the study has been granted and that the antenatal clinics hosted at these locations could be selected at random to form part of the various phases of the study (see Appendix E). Following notification, each location was

assigned a number and selected through a computer-generated randomization procedure. Ten locations were randomly selected as the recruitment sites for Study One (i.e. recruitment Phase One) and ten locations were again randomly selected as the recruitment sites for Study Two and Study Three (i.e. recruitment Phase Two).

Although the participants in this project were subject to randomization, it is not always the case in qualitative research. In addition to the generalisations permitted through random sampling procedures, Sparkes and Smith (2014) draw attention to the generalisations that are associated with qualitative research such as naturalistic generalisations (i.e. descriptions that permit contemplation and allows the reader to draw their own conclusions) and recognisability (i.e. where the reader becomes aware of certain traits or patterns and can associate them with meaning in other situations). This thinking reflects Lincoln and Guba's (1985) notion of transferability whereby thick descriptions are provided which enables readers to draw conclusions that would not have been possible without such level of description. It was the approach in this study to provide sufficient detail through thick description of the context, issues raised, and themes identified.

#### Reliability and dependability

Reliability in quantitative research refers to the consistency of the instruments used to measure the variables of interest a research study (Thomas & Nelson, 2001). For example, in Study Two of this research project the degree of reliability of the direct measures of the TPB were determined by calculating the correlation coefficient (i.e. internal consistency) whereas the reliability of indirect belief-based indices was assessed through the test-retest method. In comparison, qualitative research approaches are not concerned with reliability as each account is considered unique and therefore impossible to repeat (Sparkes & Smith, 2014). Lincoln and



Guba (1985), however, suggest dependability (or stability of data over time) as parallel to the concept of reliability. In convincing the academic community that the research process is consistent and accurate, it is necessary to provide evidence of strategies that attest to the researchers' decision-making process being "logical, traceable and documented" (Sparkes & Smith, 2014, p. 181). For example, in Study Three, a six-staged process of thematic analysis was adopted which involved: (1) data familiarization, (2) data coding, (3) identification of themes, (4) revision of themes, (5) defining and naming of themes, and (6) writing up (Braun & Clarke, 2006; Clarke & Braun, 2016). This process as a whole is available for inspection in the form of an audit trail.

#### Objectivity and confirmability

Objectivity is commonly associated with a quantitative methodology where the results of a study is said to have been obtained without being influenced by a researcher's biases and values (Lincoln & Guba, 1985). This implies that distance and impartiality must be maintained between the researcher and participants (Cresswell & Plano Clark, 2011). Indeed, no information regarding the researcher's position (i.e. bias as exercise professional) or the guidelines for exercise during pregnancy was provided to the participants in Study One and Study Two of this project. Qualitative scholars, however, maintain that objectivity is "not possible, necessary or useful" as there are many ways in which the researcher's perceptions can influence the research process and that such subjectivity should be embraced (Sarantakos, 2013, p. 35). Nonetheless, Lincoln and Guba (1985) advise that subjectivity should be managed by assurances of confirmability which implies that the data can be traced backed to their original sources and that the process used to formulate interpretations is documented. Indeed, an audit trail pertaining to this study, including both the raw data and the processes used during interpretation and analysis, are available for inspection. Furthermore, reflexivity

was embraced as a process where the role played by the researcher’s “interpretative framework or speaking position (including theoretical commitments, personal understandings and personal experiences)” could be acknowledged (Coyle, 2015, p. 20).

### 3.4.2 Quality in mixed methods research

Combining qualitative and quantitative approaches, however, brings to the fore validity issues over and above those associated with the individual methods (Creswell & Plano Clark, 2011). These issues may occur when merging or connecting quantitative and qualitative data during collection, analysis, and/or interpretation phases (Creswell & Plano Clark, 2011; see Table 3.3). To put this in context, a multiphase research design was employed in this research project, that is, three studies were implemented in phases which informed and/or explained each other.

Table 3.3: Potential validity threats and strategies when combining data in multiphase designs (adapted from Creswell & Plano Clark, 2011, pp. 240-243).

<b>Potential threat</b>	<b>Strategy employed in minimizing threat</b>
Recruiting inappropriate participants for either qualitative or quantitative data collection.	Draw quantitative and qualitative participants from the same population.
Failure to design a valid and reliable instrument.	Employ rigorous measures to develop and validate new instruments.
Not conferring the mixed methods research question(s).	Discuss each mixed methods research question.
Assigning inappropriate weight to one method of data collection or analysis.	Present both sets of data in an equal manner or provide a rationale for why a specific data form provided a better understanding of the research problem.
Failure to relate the stages or phases to each other.	Consider whether a problem, theory, or lens could be used to connect stages or phases.

In addition to the strategies used to minimize potential threats when combining studies, triangulation (or greater validity) was used as a specific technique to determine corroboration of the results obtained from the three individual studies (Greene, Caracelli, & Graham, 1989; Bryman, 2006). For example, the findings from Study One led to the development of a questionnaire that was used in Study Two with the concurrent validity of the initial qualitative findings in Study One assessed and demonstrated through quantitative methods in Study Two (i.e. correlations between belief indices and direct measures). Mixed methods research can thus be used to offset or counteract the biases associated with single methods and when the results converge or corroborate one another, the validity of the findings is strengthened (Greene et al., 1989).

Although the diversity associated with mixed methods research is considered a major strength of the approach, Tashakkori and Teddlie (2010) maintain that “diversity should be assessed in a reflective context to prevent duplication of ideas, inconsistent terminology, chaotic classifications, and burdensome pedagogy” (p. 272). Whilst typically associated with validity in qualitative research, reflexivity enables researchers to become more aware of the assumptions and biases they hold and to consider ways of using or reducing these in their research endeavours (Frost, 2016). From a pragmatic perspective, it is therefore also necessary to continuously reflect on the possible consequences (e.g. practical utility, role, and impact) of scientific inquiry, specifically, pragmatists analyse the veracity of facts through an ongoing process involving dialogue and discussion within the scientific community (Giacobbi et al., 2005). Thus, for research to be considered valid, it “needs to be defensible to the research and practice communities for whom [it] is produced and used” (Onwuegbuzie & Johnson, 2006, p. 48). For a doctoral researcher such as myself, this process involved the writing of research

proposals, discussion with peers, presentation at conferences, publishing a paper, bidding for research funding, building academic networks, and embracing the reflexive journey as a whole.

### **3.5 The reflexive journey**

Reflexivity is widely accepted as the process whereby researchers explore the impact of their assumptions and biases on the research they are conducting (Frost, 2016). This individuality can be seen as a subjective or interfering factor which compromise the quality of the research being produced (Gough, 2003). However, reflexive self-awareness allows researchers to recognise and consider how their position may affect the analysis, interpretation and reporting of findings (Sparkes & Smith, 2014).

It has been acknowledged from the outset that I entered this research project as both an exercise professional and a mother with the opinion that pregnant women should be physically active. In my attempt to be reflexive about this position and the research process as a whole, I was encouraged by my supervisory panel to maintain a reflexive journal. However, I quickly realised that this was not something I particularly relished and instead of writing descriptive accounts, my diary became a record of events, minutes of meetings, address/contact book, and a to-do list. In fact, during the first 18 months of the project, I gained most value in seeking peer support for reflexive discussion. Together with some of my fellow PhD students, we established a group that met regularly to discuss issues relevant to our projects. We called these “soundboard sessions” and it followed a format where each of us had to give a 15-minute presentation on a specific topic whilst the others provided feedback. I found it particularly valuable that my peers were students with backgrounds in different academic disciplines as it allowed me to see things from a different perspective and reminded me not to make

assumptions about other people's perceptions. For example, despite my own convictions, it became apparent very early on that not everyone was convinced that pregnant women should be exercising. As a pragmatist, I'd like to think that these engaging sessions were similar to those of the "Metaphysical Club" in the 1870's (Lally, 2015).

One of the most challenging parts of this project was getting it off the ground and I can now see why I was discouraged from taking on a project that would involve NRES approval during my Master's degree. The application process is time consuming and requires collaboration with both internal and external stakeholders, however, these relationships had to be established in the first instance. Getting the information necessary to complete the application form turned out to be a very frustrating process. An awful lot of time seem to pass by without any progress being made and with the balance of power lying in certain gatekeepers' hands. Being painfully aware of the clock ticking by, a decision was made to invest my time in completing as much of the Graduate School's required Researcher Development Program (RDP) activities during that time and to prove myself worthy of being a PhD candidate by carrying out a meta-analytic review of the literature. I subsequently attended a two-day course, acquired and became familiar with the associated software package, CMA. In addition to learning a new skill as a researcher, this process allowed me to define the research questions guiding the project. Furthermore, by publishing the findings I was able to position the project within the growing body of research.

With the necessary approvals in place and once the project had finally started, the supervisory process became invaluable and regular meetings allowed me to raise concerns, clarify matters, obtain feedback, and discuss the best way forward. This was particularly useful in terms of the mixed methods approach used in this project as each phase involved discussion with

collaborators and supervisors regarding what has been learnt and how to move forward. For example, Study One involved the recruitment of pregnant women from randomly selected antenatal clinics. The aim was to elicit the salient behavioural, normative, and control beliefs in terms of physical activity behaviour from a sample of 25 pregnant women. I was initially pleased that I managed to recruit 39 participants, however, only 18 of those that agreed to take part returned their completed questionnaires. This led to discussions around whether to return for a second round of recruitment (which would have delayed the progress of the study even further) or to learn from the initial recruitment drive and to adapt the procedure in the next phase of the study. Following deliberation, a decision was made to devise a strategy using multiple reminders and to increase the incentive for taking part in Study Two. This later proved to be a successful approach in the retention of participants.

In devising and discussing the procedures and findings of this study, it was helpful having had my own children in the very same NHS Trust but it became even more interesting as my first supervisor also had two pregnancies during the time of me completing my PhD. This inside knowledge allowed us to test ideas, establish relationships, verify practices, and identify opportunities in real time. As a mother, it was thus possible to associate with the pregnant women participating in the study, however, the benefit of inside knowledge had to be kept separate from that of creating an insider status as throughout the project I portrayed myself as an outsider that wanted to gain insight into pregnant women's thinking and midwives' experiences. This was a deliberate act as I did not want my position to unduly influence participant responses. Indeed, it is acknowledged that an outsider research position "needs to be there in order to ensure rigorous and systematic research" (Frost, 2016, p. 46). It was, however, challenging to remain a neutral outsider when recruiting pregnant women in person as inevitably many of them used the opportunity to voice their opinions and experiences. As

an exercise professional I felt an overwhelming responsibility to provide these expecting mothers with some physical activity advice and guidance, however, I had to remind myself of my position as researcher by portraying a non-judgmental image and maintaining that there were no right or wrong answers and I was only interested in people's opinions. The role of outsider also allowed me to adopt the persona of Lisa. In my dealings with community midwives in particular, I realised that my first name at times presented a barrier in communication. I responded to this by either "going with the flow" and not correcting the person if being called by the wrong name or simply introducing myself as Lisa from the outset. In doing so, my perception was that the other party felt more comfortable in addressing me directly.

Although unintended, my influence as researcher became apparent when conducting interviews with community midwives in their clinical environment. I became aware of the fact that the study in itself increased awareness of the topic which caused midwives to discuss their practises with each other. Although this may have influenced the interview discourse, there is no reason to believe that midwives were not sincere in their accounts or that this influenced the study's outcome. Whilst I was not able to stop these discussions from occurring, it is an issue for consideration in future studies in similar close-knit settings.

It should also be acknowledged in this reflexive account that mixed methods research was a novel undertaking. Having had more experience, I felt most comfortable using quantitative methods, however, I believed that the addition of qualitative methods would enhance the validity of the study and that this level of engagement with the phenomena under investigation was expected of doctoral candidates. I was, however, surprised by the fact that I enjoyed the process of mixed methods research and that triangulation (i.e. the corroboration of results) in

particular provided me with a sense of satisfaction that was not perceived on the same level in the individual studies. Mixed methods research is, however, quite an undertaking and it can at times be stressful if not overwhelming. Although this project has demonstrated that I can work as independent researcher, I share Creswell and Plano Clark's (2011) sentiments that "because of the increased demands associated with mixed methods designs, mixed methods researchers should consider working in teams" (p. 15). I hope to find myself lucky enough to be in such a position in future.

This project brought with it many challenges, most of which I coped with reasonably well. However, there were occasions in the course of this project that made me pause and question life in general. For example, I clearly remember the day when I received a phone call from one of the participants where she explained that she could no longer take part in the study because she's had a miscarriage. I was not prepared for this and was caught completely off guard. I simply did not have the right words but expressed my sympathy and thanked her for letting me know. There were also times where personal family matters made me realise that I could not be everything to everyone all of the time. Indeed, there were many occasions during the last four years where I felt that I was letting someone down. I used to look at other students thinking that they had it so much easier than I did, and that if I had done a PhD whilst I was still young and without the responsibility of caring for a family, I would have been a model student. However, through this reflexive journey I've learned that it is having had these life experiences that I was drawn to this research topic in the first place and that these experiences ultimately enriched the project.

Before embarking on my own doctoral journey, I had a conversation with someone who had just finished his. He confidently offered his advice and suggested that a PhD should be treated



like a full-time job. Long story short, that has not been my experience at all! This PhD was like having another child, one that had to be nurtured and cared for, one that made you laugh and cry, kept you up at night, and made you rise early in the morning. Like a child, it was there all the time, even when you were on holiday. In fact, some of my textbooks are adorned by hotel note pads and ticket stubs. This was not helped in any way by the growing influence of social media; constant updates on new research, latest news, and information on must attend conferences did not allow for any reprieve. I envied those students who had “full-time jobs”. But in closing this reflexive journey, I am happy to report that this child of mine has finally grown up and I’m ready to let go.

## Chapter 4: Study One

### 4.1 Introduction

The TPB (Ajzen, 1991) posits that the cognitive foundation for human behaviour is rooted in three subjective probabilities: (1) behavioural, (2) normative, and (3) control beliefs (Fishbein & Ajzen, 2010). These beliefs are acquired from a variety of sources (e.g. family environment, personal experiences, social interactions, exposure to media, etc.) and as such may persist over time or may be forgotten, whilst new beliefs are continually being formed based on recent experiences (Symons Downs & Hausenblas, 2005b). Ajzen (2015), however, clarifies that these beliefs may not be realistic and could be based on “invalid or selective information; they may be irrational, reflecting unconscious biases, paranoid tendencies, wishful thinking or other self-serving motives” (p. 133). Nonetheless, once formed and accessible in memory, attitudes, subjective norms, perceptions of control, and ultimately intentions and behaviour follow in a reasonable and consistent manner (Ajzen, 2005; see Figure 4.1). More specifically, behavioural beliefs involve the subjective probability that performance of a specific behaviour will lead to a certain outcome and thus provide the basis for attitude formation (Fishbein & Ajzen, 2010). Normative beliefs correspond with subjective norms and involve the subjective probabilities that (a) certain referents (or important others) either approve or disapprove of a specific behaviour (i.e. injunctive normative beliefs), and (b) certain referents (similar to the individual) either are or are not performing the behaviour of interest themselves (i.e. descriptive normative referents; Fishbein & Ajzen, 2010). Finally, control beliefs provide the framework for PBC and involve the subjective probability that certain factors can facilitate or hinder the execution of a specific behaviour (Fishbein & Ajzen, 2010).

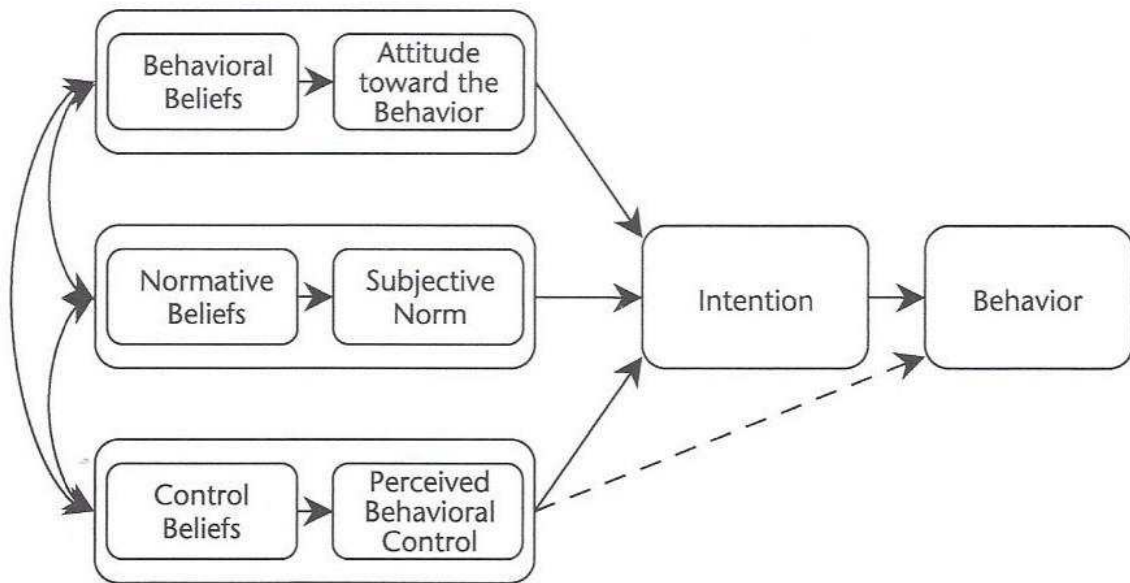


Figure 4.1: Beliefs as the informational foundation of intentions and behaviour (Ajzen, 2005; p. 126).

To determine a population’s salient beliefs with regards to a specific behaviour of interest, Fishbein and Ajzen (2010) recommend conducting an elicitation study. The significance of elicitation studies lie in the fact that they provide researchers and practitioners with valuable information regarding individuals’ thoughts and feelings about a particular behaviour (Symons Downs & Hausenblas, 2005b). These beliefs are subsequently used to construct a tailored questionnaire to measure the TPB constructs in a relation to the behaviour under investigation (Fishbein & Ajzen, 2010). However, insight into these salient beliefs also has important implications for behavioural interventions as it allows for strategies to be aligned with the specific needs of the population being studied (Hausenblas & Symons Downs, 2004).

Despite the importance of elicitation studies, a review by Symons Downs and Hausenblas (2005b) found only 47 TPB studies (two of which involved a pregnant sample) over a 22-year period (1975 - 2002) that involved the elicitation of exercise beliefs. The authors draw attention to two pertinent issues: (1) a lack of elicitation studies in the exercise literature may

compromise the efficacy of the TPB in explaining exercise behaviour, and (2) when the demographic characteristics of the elicitation sample and study sample do not resemble each other, the beliefs emerging from the elicitation study may not represent those of the target population. Indeed, failure to address these issues in research that utilize the TPB as conceptual framework has arguably led to a healthy debate over its utility (see Sniehotta, Preece, & Araújo-Soares, 2014). Whilst Ajzen (2015) acknowledges that changing intentions and behaviour is not an easy undertaking, he stresses that any intervention based on the TPB should involve formative research to elicit the readily accessible behavioural, normative and control beliefs of a sample that is representative of the target population. To subsequently produce changes in people's attitudes, subjective norms and perceptions of control, it would be necessary to either readdress (e.g. strengthen) or replace some of the population's salient beliefs (Ajzen, 2005). Modification of these predictors should, in turn, result in more favourable intentions to carry out a specific behaviour (Ajzen, 2015).

Identifying people's readily accessible beliefs is a significant step in determining the factors that may influence their ultimate behaviour. The purpose of this study is therefore twofold: (1) to determine the modal salient behavioural, normative, and control beliefs held by women in the East Kent region of England relating to them taking part in regular exercise activities during their pregnancy, (2) to develop and pilot a questionnaire informed by their beliefs.

## **4.2 Method**

### **4.2.1 Procedures**

Participants were recruited when attending an appointment at one of ten randomly selected NHS antenatal clinics in East Kent. Pregnant women were eligible for inclusion if they were

at least 18 years of age, proficient in the English language, had conceived naturally, had not had more than one previous miscarriage, and had no previous or existing condition which might be caused or aggravated by pregnancy (e.g. asthma, diabetes, high blood pressure, etc.; Clarke & Gross, 2004; RCOG, 2006a). As per RCOG (2006a) guidelines, such conditions require medically supervised exercise sessions and may therefore influence pregnant women's exercise intentions and behaviour.

The researcher explained the study and provided potential participants with an information sheet (see Appendix F), consent form (see Appendix G), demographics questionnaire (see Appendix H), beliefs questionnaire (see Appendix I), and a pre-paid envelope. Those who agreed to participate were asked to complete the consent form and demographics questionnaire on the day and to return the completed beliefs questionnaire using the pre-paid envelope included in the research pack. Non-responders were sent two reminders that included personalised cover letters with original signatures on headed paper. As incentive for taking part, participants were offered the choice of receiving a £5 high-street shopping voucher or for an equivalent charity donation to be made on their behalf. The charity chosen for this study was Tommy's (n.d.) who fund research into pregnancy complications (e.g. preterm birth, miscarriage, stillbirth, etc.) and provide related information to parents (see Appendix D).

Following content analysis, a draft version of the TPB questionnaire was developed (see Appendix J). This was sent to all participants and feedback was requested in terms of wording, clarity, time it took to complete, etc. (see Appendix K). A further £5 was offered as incentive for completing the pilot and feedback questionnaire.

### 4.2.2 Measures

Consistent with the procedure recommended by Fishbein and Ajzen (2010), participants were asked to complete a questionnaire using open-ended questions to describe their beliefs about exercise during pregnancy (see Appendix I). Each of the belief items were followed by five lines and participants were instructed to list the thoughts that came immediately to mind and to write each thought on a separate line. To ensure compatibility with respect to the action (exercise), target (pregnant women), time (pregnancy) and context (broad) elements of the behaviour under investigation, participants read the following statement prior to addressing these belief items:

Exercise forms part of our daily lives and can take on many forms. Sometimes we may not even realise that we are in fact exercising. For the purpose of this questionnaire exercise is therefore defined as any regular moderate physical activity that requires you to expend energy. For example, performing any one or a combination of the following activities on at least 4 days of the week: walking 2 miles in 30 minutes, gardening for 30-45 minutes, pushing a stroller 1.5 miles in 30 minutes, washing floors/windows for 45-60 minutes, swimming for 20 minutes, dancing for 30 minutes, running 1.5 miles in 15 minutes, etc.

The following open-ended questions were then used to elicit pregnant women's beliefs:

Behavioural beliefs:

- (1) What do you see as the advantages of you exercising during your pregnancy?
- (2) What do you see as the disadvantages of you exercising during your pregnancy?

Injunctive normative beliefs:

When it comes to you exercising during your pregnancy there might be individuals or groups who would think that you should or should not perform this behaviour.

- (1) Please list the individuals or groups who would approve or think you should exercise during your pregnancy.
- (2) Please list the individuals or groups who would disapprove or think you should not exercise during your pregnancy.

Descriptive normative referents:

Sometimes, when we are unsure what to do, we look to see what others are doing.

- (1) Please list the individuals or groups who you think are most likely to exercise during their pregnancy.
- (2) Please list the individuals or groups who you think are least likely to exercise during their pregnancy.

Control beliefs:

- (1) Please list any factors or circumstances that would make it easy or enable you to exercise during your pregnancy.
- (2) Please list any factors or circumstances that would make it difficult or prevent you from exercising during your pregnancy.

## **4.3 Results**

### **4.3.1 Sample characteristics**

Of the 39 pregnant women who agreed to participate, 18 completed the study (i.e. the response rate was 46%). The majority of participants described themselves as being of English or British nationality (89%) with English being their first language (94%). Participants had an average age of 30 years ( $M = 30.06$ ,  $SD = 4.79$ ) with most women being married (61%), in full or part-time employment (89%), and having attained a Level 5 education (i.e. diploma of higher education or foundation degree) or above (67%). For most participants this was their first pregnancy (72%) with the average gestational age being 24 weeks. Thirteen of the respondents (72%) reported participating in leisure or sports activities on a regular basis in the 12 months prior to their pregnancy whilst only 9 (50%) reported maintaining these activities during pregnancy. Of those who completed the study, 11 (61%) elected for a £5 donation to be made on their behalf to the charity Tommy's whilst the remaining 7 (39%) selected to receive a £5 high-street shopping voucher.

### **4.3.2 Modal behavioural, normative and control beliefs**

A content analysis of the pregnant women's beliefs was performed by grouping responses into themes and subsequent labelling of categories with suitable tags (Francis et al., 2004). Content validity was established by having the researcher's first supervisor check the analysis process and categorization (Elo et al., 2014). In case of disagreement, grouping possibilities were considered until consensus was obtained.

The strategy used to compile the modal set of beliefs is that suggested by Fishbein and Ajzen (2010) whereby beliefs are selected based on their frequency of emission until 75% of all



responses listed are accounted for. For example, in the case of behavioural beliefs, participants were asked to list the advantages of them exercising during their pregnancy. The total number of responses provided were 53; a 75% decision rule implies that as many of the most frequently mentioned advantages as needed to account for 40 responses are included in the modal set. The modal salient exercise beliefs of pregnant women in East Kent are summarized in Table 4.1, 4.2, 4.3, and 4.4.

Table 4.1: Modal salient behavioural beliefs of pregnant women in East Kent.

<b>Advantages</b>	<b>N = 53</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Improved physical fitness	13	24.53	24.53
Improved general health	12	22.64	47.17
Weight management	6	11.32	58.49
Better prepared for labour	5	9.43	67.92
Psychological wellbeing	5	9.43	77.35
<b>Disadvantages</b>	<b>N = 28</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Fatigue	9	32.14	32.14
Overdoing it	5	17.86	50.00
Fear of harming baby	5	17.86	67.86
Injury	3	10.71	78.57

Table 4.2: Modal salient injunctive normative beliefs of pregnant women in East Kent.

<b>Approve</b>	<b>N = 40</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Health professionals	15	37.50	37.50
Family	8	20.00	57.50
Friends	6	15.00	72.50
Husband/partner	4	10.00	82.50
Exercise professionals	4	10.00	92.50
<b>Disapprove</b>	<b>N = 18</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Family	4	22.22	22.22
Health professionals	3	16.67	38.89
Friends	2	11.11	50.00
Society in general	2	11.11	61.11
Older people	2	11.11	72.22
Complicated pregnancies	2	11.11	83.33

Table 4.3: Modal salient descriptive normative referents of pregnant women in East Kent.

<b>Most likely</b>	<b>N = 28</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Active people	14	50.00	50.00
Health/exercise professionals	4	14.29	64.29
Experienced mums	2	7.14	71.43
Those without health issues	2	7.14	78.57
Those without dependents	2	7.14	85.71
<b>Least likely</b>	<b>N = 32</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Those with health issues	10	31.25	31.25
Inactive people	6	18.75	50.00
Those who suffered previous loss	6	18.75	68.75
First pregnancy	4	12.50	81.25

Table 4.4: Modal salient control beliefs of pregnant women in East Kent.

<b>Easy/enable</b>	<b>N = 35</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Increased access and availability	9	25.71	25.71
Having more time available	7	20.00	45.71
Improved knowledge	5	14.29	60.00
Affordability	5	14.29	74.29
Suitable activity structure	5	14.29	88.58
<b>Difficult/prevent</b>	<b>N = 41</b>	<b>Percentage</b>	<b>Cumulative Percentage</b>
Health issues	11	26.83	26.83
Not having enough time	10	24.39	51.22
Fatigue	6	14.63	65.85
Having dependents	4	9.76	75.61
Limited access	4	9.76	85.37

#### 4.3.3 Development of the TPB Questionnaire

The guidelines provided by Ajzen (2002), Fishbein and Ajzen (2010), and Francis et al. (2004) were used to inform the development of the first draft of the TPB questionnaire. This questionnaire consisted of 53 items and contained both belief indices and direct measures of the TPB constructs (see Appendix I). Participants were asked to complete the questionnaire and then to comment on wording, clarity, layout, timing, etc. (see Appendix K). Of the 18 participants who completed the beliefs questionnaire, seven piloted and provided feedback on the first draft of the TPB questionnaire. Following consideration of participant comments, minor amendments were applied before the questionnaire was implemented during Study Two. The validity and reliability of the questionnaire items and scales are addressed in Chapter 5.

#### **4.4 Discussion**

The purpose of this study was to (1) determine the modal salient behavioural, normative, and control beliefs held by women in the East Kent region of England relating to them taking part in regular exercise activities during their pregnancy, and (2) develop a TPB questionnaire informed by the elicited beliefs.

In terms of behavioural beliefs, the main advantages reported by pregnant women in this study are keeping fit and being healthy. Two issues seem to be of relevance here. Firstly, whilst these are important benefits of regular exercise they are also pertinent in the general population which suggests that pregnant women may not be aware of the specific benefits that physical activity could offer during pregnancy. For example, a recent meta-analysis supported the hypothesis that regular exercise increases the likelihood of a normal delivery in healthy pregnant women (Poyatos-Leon et al., 2015). Another topical meta-analysis showed that regular moderate physical activity during pregnancy is associated with both a reduced risk of gestational diabetes and lower incidence of excessive maternal weight gain (Sanabria-Martinez et al., 2015). Secondly, the advantages included within the modal set are all related to the mother and suggest little awareness of the potential benefits for baby. For example, recent research using a porcine animal model suggests that aerobic exercise during pregnancy improves vascular function which may have long term health implications for offspring (Bahls et al., 2014). It is therefore not surprising that research focus has shifted from concerns for the health and well-being of mother and baby to how maternal physical activity might affect future chronic disease risk (Pivarnik et al., 2006). However, given these findings, it would appear that this has not translated into information that is accessible to pregnant women.

Consistent with previous research (Duncombe et al., 2009), the main disadvantage of exercising during pregnancy identified through this study is fatigue. Whilst feeling tired is a common characteristic of pregnancy, especially during the first and third trimesters, Gaston and Prapavessis (2013) suggest that regular physical activity is useful in managing pregnancy-related fatigue. They showed that following four weeks of intervention, previously inactive women who met the guidelines for exercise during pregnancy (i.e. four bouts of moderate to vigorous intensity physical activity per week; n = 17) reported lower fatigue and increased vigour compared to those who did not meet the guidelines (n = 39). It would therefore be useful to advise pregnant women on how exercise can be used to address potential discomforts and barriers such as fatigue during pregnancy. This advice needs to be consistent and supportive in nature, particularly in the early stage of pregnancy as it is here where participation levels start to decline (Weallens, Clark, MacIntyre, & Gaudoin, 2003). However, as pregnancy experiences vary, individualised support and tailored interventions may be of greater benefit than generalised educational approaches. Future research should examine the viability and cost-effectiveness of such endeavours.

Regarding normative beliefs, expectant mothers were of the opinion that health professionals (e.g. midwives) in particular would approve of them exercising during their pregnancy. Interestingly, midwives have been identified in previous research as being ideally placed to advise and support pregnant women with regards to physical activity (Weir et al., 2010). It is further suggested that this level of support may also help women to establish long-term physical activity habits (Haakstad, Voldner & Bo, 2013). However, evidence suggests that health professionals either provide insufficient advice or give inappropriate guidance (Stengel, Kraschnewski, Hwang, Kjerulff & Chuang, 2012). Within the NHS, midwives play an essential and direct part in the information that pregnant receive, however, little is known about

the role of these practitioners in providing adequate physical activity guidance. Future research should consider health practitioners' knowledge and experiences and include midwives in interventions and health campaigns aimed at increasing physical activity during pregnancy.

Fewer beliefs were elicited when it came to the individuals or groups who pregnant women believed would disapprove of them exercising during pregnancy and here it should also be noted that five participants suggested that “nobody” would fit into this category and two participants provided no answer. This may be because exercise behaviour during pregnancy has become a more acceptable social practice. Whilst pregnant women have traditionally been subjected to restrictions based on “folkloric medical wisdom and taboo rather than systematic medical science” (Sutton, Douglas & McClellan, 2011, p. 597), pregnancy is no longer considered a condition for confinement with the effects of a sedentary lifestyle requiring consideration (Artal & O’Toole, 2003, RCOG, 2006a, Jukic et al., 2012).

The main normative referents identified by pregnant women in this study are those who already enjoy an active lifestyle. This finding echoes that of a review by Gaston and Cramp (2011) indicating that women who were active prior to pregnancy remained more active during pregnancy. Interventions and public health campaigns that aim to increase physical activity should therefore specifically target women in their child bearing years (Gaston & Cramp, 2011). Conversely, pregnant women identified those with health issues as least likely to exercise during their pregnancy. This is not surprising as participation in regular moderate intensity physical activity and strength conditioning is recommended in the absence of either medical or obstetric complications (Artal & O’Toole, 2003). However, perceived health status may also have an impact on the uptake and continuation of physical activities. For example, Evenson, Savitz, and Huston (2004) found that compared to pregnant women who reported

their general health as “fair” or “poor” (n = 114), leisure activity was more likely in those who rated their general health as “excellent” or “very good” (n = 1,404). It would therefore be necessary for health care providers to provide pregnant women with an objective assessment of their health status and to provide guidance accordingly.

Two of the main factors that would make it easy or enable women to exercise during their pregnancy are accessibility of suitable exercise opportunities and having time available. Conversely, health issues, not having enough time and fatigue are factors that would make it difficult or prevent pregnant women from exercising. These findings are analogous with Gaston and Cramp’s (2011) review of the patterns and determinants of exercise during pregnancy. Specifically, they found the most common obstructing factors to be physical restrictions, tiredness and time limitations. Future research should assess the feasibility of multilevel interventions i.e. providing pregnant women with more opportunities to participate in pregnancy specific activities whilst identified barriers may need to be addressed on an individual basis.

#### **4.5 Conclusion**

Ajzen and Fishbein (1980) maintain that ultimate behaviour can be traced back to an individual’s personal beliefs. In this study, not only have the modal salient exercise beliefs of pregnant women in East Kent been identified but the need for researchers and practitioners to give greater consideration to these factors have been illustrated. Without an appreciation of the beliefs underlying expectant mothers exercise behaviour, it is unlikely that interventions will be appropriate which may, in turn, have implications for the long-term health of both women and children. Given the importance of elicitation studies in informing behaviour

change interventions and research using the TPB as conceptual framework, investigators and practitioners are urged to conduct formative research to identify the behavioural, normative and control beliefs of pregnant populations across the UK.



## **Chapter 5: Study Two**

### **5.1 Introduction**

The next step in this multiphase research design involves administration of the questionnaire that was developed on the basis of the elicitation phase (i.e. Study One). Specifically, the newly developed questionnaire permits evaluation of the TPB in the context of pregnant women's exercise intentions and behaviours in order to determine the predictive utility of the theory constructs. In addition, this phase also serves as validation of the salient beliefs identified previously whereby belief indices should correlate with direct measures, that is, low correlations would indicate that changes in the identified beliefs will not have the desired effect on the determinant of interest (Fishbein & Ajzen, 2010). This is an important factor to consider in any behavioural intervention that may result from this study and TPB studies alike. Furthermore, De Vivo et al. (2016) have shown that attitude, subjective norm and PBC are all correlated with pregnant women's intentions to be physically active, however, an effective intervention will focus on the determinant that carries most weight in predicting intentions (Fishbein & Ajzen, 2010).

Due to lack of statistical power, De Vivo and colleagues (2016) were unable to provide a meta-analytic examination of the utility of the TPB in predicting physical activity intentions and behaviours during pregnancy. However, in the broader context of exercise behaviour, Symons Downs and Hausenblas (2005a) showed that: (1) intention is the strongest determinant of exercise behaviour, (2) both intention and PBC predict exercise behaviour but only intention provides a unique contribution, (3) attitude is the strongest determinant of intention, (4) attitude, subjective norm and PBC all predict exercise intention, however, only attitude and

PBC provide unique contributions, and (6) whilst emerging as the primary determinant, attitude was only marginally stronger than PBC in predicting intention . The authors explained that these findings have important implications for designing physical activity interventions as they show that “how people feel about exercise (i.e., their attitude) has the greatest impact on whether they will plan to exercise (i.e., their intention)” (p. 87). This may, however, not be the case for physical activity during pregnancy. For example, in their evaluation of pregnant women’s exercise intention and behaviour during the first trimester (N = 104), Hausenblas and Symons Downs (2004) reported that PBC was the strongest determinant of exercise behaviour and whilst attitude was the strongest predictor of intention, subjective norm also emerged as a significant predictor and PBC failed to predict exercise intentions. Contrasting results were also noted in Symons Downs and Hausenblas’ (2007) examination of pregnant women’s third trimester exercise intention and behaviour (N = 62) where intention was identified as the strongest determinant of exercise behaviour, however, subjective norm emerged as the strongest determinant of intention. Whilst attitude also provided a unique contribution to the prediction of exercise intention, PBC did not. Generally, people are inclined to engage in a behaviour when they view it positively (attitude), when they perceive social pressure to participate (subjective norm), and when they believe that they have the required resources and opportunities to do so (PBC; Ajzen, 2005). However, it is recognized that the relative contribution of these three predictors may vary between individuals and populations and that in some contexts only one or two factors are relevant, whereas all three factors emerge as significant determinants in others (Ajzen, 2005).

Moreover, De Vivo et al. (2016) also identify inconsistency regarding the role of past behaviour in predicting pregnant women’s exercise intentions and behaviours. Specifically, Zamora-Flyr (2010) found walking behaviour during the second trimester to predict walking behaviour

during the third trimester, whilst, Hausenblas, Symons Downs, Giacobbi, Tuccitto and Cook (2008) did not find pre-pregnancy exercise behaviour to predict pregnancy exercise behaviour. In their study, Godin, Valois and Lepage (1993) found that neither intention nor PBC as measured during pregnancy contributed to the prediction of postnatal exercise behaviour. There is, however, an important caveat to note with regards to these three studies; pre-pregnancy exercise behaviour takes place in a different context to pregnancy exercise behaviour, the same as pregnancy exercise behaviour takes place in a different context to postnatal exercise behaviour. In attempting to understand the role of past behaviour, researchers often reason that frequent performance of a behaviour in the past leads to the formation of habits or behavioural tendencies which are then more likely to result in automatic responses (Oulette & Wood, 1998). The “automatic habit hypothesis” implies that intention progressively becomes irrelevant as habits are formed (Fishbein & Ajzen, 2010, p. 52). Thus, in stable contexts, it is argued that future behaviour will be influenced directly by past behaviour, however, when habits are unlikely to develop due to lack of opportunity to engage regularly in a specific behaviour or when a change in context occurs, the effect of past behaviour is said to indirectly influence future behaviour through consciously formed intentions (Oulette & Wood, 1998). However, neither the meta-analysis nor the original study carried out by Oulette and Wood (1998) could support this hypothesis.

In their meta-analysis involving physical activity behaviours, Hagger et al. (2002) found that while past behaviour weakened relationships between TPB constructs, it did not eliminate the effects of attitudes on intentions, intentions on behaviour, or PBC on behaviour. Past behaviour, however, emerged as significant predictor of future behaviour ( $\beta = .55, p < .01$ ), intention ( $\beta = .37, p < .01$ ), attitude ( $\beta = .39, p < .01$ ), subjective norm ( $\beta = .05, p < .01$ ), PBC ( $\beta = .23, p < .01$ ), and self-efficacy ( $\beta = .45, p < .01$ ). Furthermore, in a recent meta-analysis

pertaining to health behaviours (including risk, detection, physical activity, dietary, safe sex, and abstinence behaviours), McEachan, Conner, Taylor, and Lawton (2013) reported the inclusion of past behaviour to contribute an additional 10.9% variance to the prediction of behaviour and 5% to the variance in intention. Past behaviour also emerged as the strongest predictor of future behaviour but not intention.

The main aim of this study is therefore to examine the predictive utility of the TPB in explaining pregnant women's physical activity intentions and behaviour and to scrutinise the role of past behaviour within this context. Specifically, it is hypothesized that: (1) concerning the original TPB, intention will be the strongest determinant of exercise behaviour, and attitude will be the strongest determinant of intention; (2) when controlling for past behaviour, the influence of intention and PBC on future behaviour will be attenuated with unique influences remaining, and the influence of attitudes, subjective norms and PBC on intentions will be attenuated with unique influences remaining; (3) when adding past behaviour as additional variable, the model will explain significantly more variance in pregnant women's exercise intentions and behaviour.

## **5.2 Methods**

### **5.2.1 Procedures**

Participants were recruited over a period of five months when attending an appointment at one of ten newly randomly selected NHS antenatal clinics in East Kent. Pregnant women were eligible for inclusion if they were at least 18 years of age, proficient in the English language, had conceived naturally, had not had more than one previous miscarriage, had no previous or existing condition which might be caused or aggravated by pregnancy (e.g. asthma, diabetes,

high blood pressure, etc.; Clarke & Gross, 2004, RCOG, 2006a), and had not participated in the previous phase of the research project. Following introduction of eligible participants by the midwife, the researcher explained the study and provided potential participants with an information sheet (see Appendix N), consent form (see Appendix O), and demographics questionnaire (see Appendix P). Those who agreed to participate were asked to complete the consent form and demographics questionnaire on the day and were then offered the choice of completing the study questionnaires in written (paper) or electronic (online) format. Participants were subsequently required to complete the Pregnancy Physical Activity Questionnaire (PPAQ; Chasan-Taber et al., 2004) and the newly developed TPB questionnaire on two separate occasions at least two weeks apart (Francis et al., 2004; see Appendix Q and R).

Non-responders at both “Time 1” and “Time 2” were sent three reminders before being excluded from the study. The first reminder was sent using the participant’s preferred method of communication. That is, those who chose to complete the written format of the questionnaires received a personalised reminder letter with original signatures on headed paper whilst those who chose to complete the questionnaire online received a personalised e-mail reminder containing a link to the questionnaire. The second reminder was sent using the alternative method. That is, those who chose to complete the written format of the questionnaires were sent an e-mail containing a link to the online format of the questionnaire whilst those who chose to complete the questionnaire online were sent a personalised reminder letter with original signatures on headed paper including the study questionnaire and a pre-paid envelope. A final reminder letter was sent with original signatures on headed paper specifying a cut-off date by which participants had to respond.

As incentive for taking part and completing the study, participants were offered the choice of receiving a £10 high-street shopping voucher or for an equivalent donation to be made on their behalf to the charity Tommy's (see Appendix D). Participation was voluntary and women could choose to withdraw from the study at any time without the standard of care they receive being affected.

## **5.2.2 Measures**

### **5.2.2.1 Demographics Questionnaire**

A demographics questionnaire was developed for this study and assessed pregnant women's age, main language, ethnicity, marital status, education level, employment status, annual household income, information relating to their current pregnancy (e.g. due date, number of weeks pregnant, etc.) and previous pregnancies (e.g. complications, mode of delivery, etc.), and information regarding their previous and current physical activity status (see Appendix P). Specifically, participants were asked whether they had regularly participated in any physical activities in the 12 months leading up to their pregnancy and to describe these activities (e.g. netball – three times per week for at least 60 minutes; running – three times per week for at least 30 minutes, etc.). Similarly, participants were asked if they were participating in any regular physical activities during their pregnancy and to describe these activities (e.g. yoga – three times per week for at least 45 minutes; walking the dog – four times per week for at least 15 minutes).

### **5.2.2.2 Pregnancy Physical Activity Questionnaire (PPAQ)**

The PPAQ is a self-administered instrument measuring the type, duration, frequency, and intensity of total activity in pregnant women (Chasan-Taber et al., 2004). Respondents are

asked to report the amount of time spent taking part in 32 activities which comprise the following categories: household/caregiving (n = 13), occupational (n = 5), transportation (n = 3), sports and exercise (n = 8), and inactivity (n = 3). Participants also have the opportunity to report activities not captured by the questionnaire. The self-reported time spent per activity is subsequently multiplied by its corresponding intensity to determine a measure of average weekly energy expenditure (MET-hours per week). The Compendium of Physical Activities (Ainsworth et al., 2011) was used as a guide to identify metabolic equivalents (METs or intensity) for additional activities identified by participants. Furthermore, the average number of MET-hours per week performed in each activity category (e.g. occupational) was calculated. Activities were classified into sedentary (< 1.5 METs), light (1.5 to < 3.0 METs), moderate (3.0 to 6.0 METs) or vigorous (> 6.0 METs) intensities. Light, moderate and vigorous activities were subsequently summed to compute the average MET hours per week representing a respondent's total activity.

In their validation of the questionnaire, Chasan-Taber and colleagues (2004) studied a sample of 54 pregnant women using 7 days of accelerometer measurement. They found the PPAQ to be a reasonably accurate and reliable measure of physical activity in pregnant women with intraclass correlation coefficients (r) ranging from .78 to .93. The questionnaire has also been validated in French using a sample of 49 obese pregnant women with test-retest coefficients (r) ranging from .59 to .90 (Chandonnet, Saey, Alméras, & Marc, 2012). Spanish (Chasan-Taber et al., 2004), Vietnamese (Ota et al., 2008), Japanese (Matsuzaki et al., 2014) and Turkish versions (Tosun et al., 2015) of the questionnaire are also in use.

Whilst Chasan-Taber et al. (2004) based their calculations upon MET intensity levels reported in The Compendium of Physical Activities (Ainsworth et al., 2000), they recognise that these

values may not be accurate representations of physical activity in pregnant women as Compendium-based data is obtained from men, non-pregnant women, and laboratory settings. Indeed, research has showed that field measurements among pregnant women could vary by 6 to 42 % (0.2 – 2.0 METs) from Compendium-based values (Roberts et al., 2002). The PPAQ was, however, designed with epidemiology in mind and the ability of the questionnaire to rank pregnant women with respect to their activity level as opposed to absolute energy expenditure takes preference (Chasan-Taber & Smith, 2016).

The original PPAQ set the scene by asking pregnant women to report their activities during a specific trimester e.g. “During this trimester, how much time do you usually spend preparing meals (cook, set table, wash dishes)?” In this study, the PPAQ was completed on two separate occasions at least two weeks apart. The questionnaire employed during “Time 1” served as a measure of historic pregnancy physical activity and questions were therefore opened with “Since becoming pregnant...” whilst the “Time 2” questionnaire measured current pregnancy physical activity and questions were opened with “During the previous two weeks of your pregnancy...” (see Appendix Q and R).

### **5.2.2.3 TPB Questionnaire**

The TPB questionnaire used in this study was informed by the elicitation study carried out previously (i.e. Study One as described in Chapter Four). The developed questionnaire was subsequently also piloted during Study One and minor amendments (e.g. correction of typing errors, layout, etc.) were applied (see Appendix Q and R).



### **Behavioural criterion**

In line with the RCOG (2006a) guidelines for exercise during pregnancy, participants were asked to rate each of the questionnaire items with regards to them taking part in moderate physical activity for 15 to 30 minutes on at least four days of the week during their pregnancy. To ensure compatibility with respect to the target, action, context, and time (TACT) elements of the behaviour under investigation, participants read the following statement prior to completing the questionnaire:

In this section we are interested in your opinion about taking part in regular moderate physical activity during your pregnancy. It is important to recognise that exercise forms part of our daily lives and can take on many forms. Sometimes we may not even realise that we are in fact exercising. For the purpose of this questionnaire, regular exercise is defined as any moderate physical activity (e.g. yoga, gardening, water aerobics, housework, etc.) that requires you to expend energy whilst still being able to hold a conversation (e.g. walking briskly at a pace of 3 miles per hour) and is performed continuously for 15 to 30 minutes on at least four days of the week during your pregnancy.

Pregnant women's exercise behaviour was measured on two occasions using a behaviour statement involving both a dichotomous and frequency criterion. The following items were used at "Time 1" and served as a measurement of proximal past behaviour within the context of pregnancy:

Question 1: Have you been exercising regularly during your pregnancy? [dichotomous criterion]

Question 54: So far during my pregnancy, I have exercised on \_\_\_\_\_ days of the week. [frequency criterion]

The following items were used at “Time 2” and served as a measurement of current physical activity behaviour:

Question 1: During the previous 2 weeks of your pregnancy, have you been exercising regularly? [dichotomous criterion]

Question 54: During the previous 2 weeks of my pregnancy, I have exercised on \_\_\_\_\_ days of the week. [frequency criterion]

### **Behavioural intentions**

Two methods of intention measurement were included in the questionnaire:

#### **A. Intention performance**

To achieve scale correspondence with exercise behaviour, the following item was used as a measure of “intention performance”:

Question 11: On how many days of the week do you intend to exercise during your pregnancy?

A single item to measure “intention performance” is consistent with previous research (Symons Downs & Hausenblas, 2003; 2007; Hausenblas & Symons Downs, 2004).

#### **B. Generalised intention**

Three items were used as a measure of “generalised intention”. Participants were asked to rate each item on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Question 5: I expect to exercise regularly during my pregnancy.

Question 18: I want to exercise regularly during my pregnancy.

Question 20: I intend to exercise regularly during my pregnancy.

The internal consistency score for the three items was excellent ( $\alpha = .88$ ). The mean score represented the intention score.

## **Attitude**

### A. Direct measure of attitude

According to the TPB, attitude is defined as a person's overall evaluation based on the perceived consequences of engaging in a specific behaviour (Ajzen, 2002). However, Ajzen (2002) recognises that overall evaluation comprises two distinguishable components and recommends that the final set of scales include adjective pairs of both types, as well as the good/bad scale which provides a reasonable indication of overall evaluation. The first type of evaluative component is instrumental in nature (i.e. instrumental items) and is represented by adjective pairs such as valuable/worthless and harmful/beneficial whilst the second type of evaluative component has a more experiential quality (i.e. experiential items) and is reflected in adjective pairs such as pleasant/unpleasant and enjoyable/unenjoyable (Ajzen, 2002).

In this study the direct measurement of attitude involved the use of seven bipolar adjectives which were evaluative in nature. Consistent with Ajzen's (2002) recommendations, both instrumental and experiential items were included in the questionnaire and positive and negative endpoints were counterbalanced to reduce the possibility of response sets.

Question 25: Exercising regularly during my pregnancy will be: [overall evaluation]

Good            1        2        3        4        5        6        7        Bad

Question 34: Exercising regularly during my pregnancy will be: [instrumental]

Useless        1        2        3        4        5        6        7        Useful

Question 37: Exercising regularly during my pregnancy will be: [instrumental]

Foolish        1        2        3        4        5        6        7        Wise

Question 17: Exercising regularly during my pregnancy will be: [instrumental]

Harmful        1        2        3        4        5        6        7        Beneficial

Question 12: Exercising regularly during my pregnancy will be: [experiential]

Pleasant       1        2        3        4        5        6        7        Unpleasant

Question 43: Exercising regularly during my pregnancy will be: [experiential]

Boring         1        2        3        4        5        6        7        Exciting

Question 29: Exercising regularly during my pregnancy will be: [experiential]

Unenjoyable 1        2        3        4        5        6        7        Enjoyable

Items were recoded so that higher numbers reflected a positive attitude towards exercise behaviour. The internal consistency score for the seven items was excellent ( $\alpha = .93$ ). The mean of the item scores represented an overall attitude score.

## B. Behavioural beliefs

Attitude toward a specific behaviour is determined by accessible beliefs about the likely consequences of engaging in that behaviour (Ajzen, 2005). Thus, each of these behavioural beliefs relate the behaviour to a certain outcome and attitude toward the behaviour is therefore determined by an individual's evaluation of the outcomes associated with the behaviour and by the strength of these associations (Ajzen, 2005). By multiplying belief strength and outcome

evaluation, and subsequently summing the resulting products, an estimate of the attitude toward the behaviour is obtained (Ajzen, 2005). This expectancy-value model is expressed symbolically as:

$$A_B = \sum b_i e_i$$

Where  $A_B$  represents attitude toward behaviour B;  $b_i$  is the behavioural belief that engaging in behaviour B will lead to outcome i,  $e_i$  is the evaluation of outcome i; and the sum is over the number of behavioural beliefs accessible at the time (Ajzen, 2005).

The modal salient behavioural beliefs identified in Study One were converted into a set of statements representing the beliefs which could affect the exercise behaviour of pregnant women in East Kent (see Table 4.1). The “behavioural belief strength” statements included in this questionnaire consisted of five items and participants were asked to rate each item using a 7-point Likert scale ranging from 1 (extremely likely) to 7 (extremely unlikely).

Question 35: Exercising regularly during my pregnancy will improve my fitness.

Question 46: Exercising regularly during my pregnancy will contribute to a healthy lifestyle.

Question 39: Exercising regularly during my pregnancy will help me to manage my weight.

Question 16: Exercising regularly during my pregnancy will prepare me for labour/delivery

Question 28: Exercising regularly during my pregnancy will contribute to my psychological well-being (e.g. reduce stress).

“Outcome evaluations” (i.e. evaluation of the “behavioural belief strength” statement) were assessed in the form of an incomplete declaration with the response provided on a 7-point Likert scale ranging from 1 (extremely undesirable) to 7 (extremely desirable).

Question 6: Improving my fitness during this pregnancy is:

Question 3: Having a healthy lifestyle during this pregnancy is:

Question 19: Managing my weight during this pregnancy is:

Question 44: Being better prepared for labour/delivery is:

Question 40: My psychological well-being (e.g. not feeling stressed) during this pregnancy is:

Items were recoded so that higher numbers reflected a positive attitude towards exercise behaviour. Each “behavioural belief strength” score was multiplied by the relevant “outcome evaluation” score and the resulting products summed across all the items to create a behavioural beliefs score:

$$\Sigma = (Q35 \times Q6) + (Q46 \times Q3) + (Q39 \times Q19) + (Q16 \times Q44) + (Q28 \times Q40)$$

### **Subjective norm**

#### A. Direct measurement of subjective norm

The direct measurement of subjective norm generally involves the use of questions that determine how a respondent judges the views of important others in relation to a given behaviour (Francis et al., 2004; Ajzen, 2005). This method of questioning assesses injunctive norms, that is, perceptions of what should (or should not) be done with respect to engaging in a specific behaviour (Fishbein & Ajzen, 2010). However, Ajzen (2002) points out that responses to this line of questioning often result in low variability as important others are typically viewed as “approving of desirable behaviours and disapproving of undesirable behaviours” (p. 6). To ensure that the total social pressure experienced by respondents is captured, Ajzen (2002) and Fishbein and Ajzen (2010) recommend that the measures of subjective norm also include descriptive norm items, that is, questions where respondents indicate whether they think that important others (or those in similar situations) are themselves

also performing the behaviour in question. In doing so, the higher-order construct of subjective norm represents both the desires and actions of significant social referents (Fishbein & Ajzen, 2010). It is, however, important to note that few studies have assessed both types of norms and reported the correlations between them, hence, the operationalisation of descriptive norms remains imperfect (Fishbein & Ajzen, 2010).

At the outset, the direct measurement of subjective norm in this study consisted of five items. Consistent with Ajzen's (2002) recommendations, both injunctive and descriptive norm items were included in the questionnaire. Participants were asked to rate each of the following five items using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Question 2: Most people who are important to me think that I should exercise regularly during my pregnancy. [injunctive]

Question 33: It is expected of me to exercise regularly during my pregnancy. [injunctive]

Question 51: I feel under social pressure to exercise regularly during my pregnancy. [injunctive]

Question 14: Most people who are important to me want me to exercise regularly during my pregnancy. [injunctive]

Question 49: Most pregnant women exercise regularly during their pregnancy. [descriptive]

The five items included in the initial measurement showed an undesirable level of internal consistency ( $\alpha = .69$ ). Following inspection and subsequent removal of Question 51, the reliability of the scale improved to an acceptable level ( $\alpha = .74$ , cf. Pallant, 2016). It should be noted that had Question 49 also been removed from the scale, the internal consistency would have improved further, in other words, items representing injunctive norms had a good level

of internal consistency ( $\alpha = .82$ ). This finding is not surprising as it is recognized that injunctive and descriptive norms reflect different aspects of perceived social pressure and can therefore either echo each other or be contradictory (Fishbein & Ajzen, 2010). Therefore, as Question 49 is the only item measuring descriptive norms and the scale now had acceptable internal consistency, it was retained to provide a single index of perceived normative pressure. The mean of the item scores represented an overall subjective norm score.

#### B. Normative beliefs

According to the TPB, accessible injunctive normative beliefs provide the cognitive foundation for injunctive norms whereas descriptive norms are determined by accessible descriptive normative beliefs (Fishbein & Ajzen, 2010). The relation between normative beliefs and subjective norm was initially based on the assumption that behaviour was likely to be affected by (a) injunctive normative beliefs to the extent that individuals are motivated to comply with a specific social referent, and (b) descriptive normative beliefs to the extent that the perceived behaviour of certain referents has a greater influence on an individual's behaviour as compared to the influence of perceived behaviours displayed by other referents (Fishbein & Ajzen, 2010). Similar to the relationship between attitudes and behavioural beliefs, the calculation of a normative belief-based measure can also be considered in terms of an expectancy-value formula; expressed symbolically as:

$$SN = \sum n_i m_i$$

Where, SN is the subjective norm;  $n_i$  is the normative belief involving social referent  $i$ ,  $m_i$  is the individual's motivation to comply (or identification) with referent  $i$ , and the sum is over the number of accessible beliefs (Ajzen, 2002; 2005). Fishbein and Ajzen (2010), however, concede that this formulation (Method A) adds little or nothing to the prediction of subjective norms and recommend that following identification of salient descriptive and injunctive



normative beliefs, these should be combined to provide an index of normative beliefs that determines social norm (Method B). To allow for comparison and further discussion, both methods of obtaining a belief-based measure is reported in this study.

The modal salient injunctive and descriptive beliefs identified in Study One were converted into a set of statements representing the normative beliefs of pregnant women in East Kent (see Table 4.2 and 4.3). “Normative beliefs” were assessed with six items and participants were asked to rate each item using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Question 21: Health professionals (e.g. midwife) think that I should exercise regularly during my pregnancy. [injunctive]

Question 52: My family thinks that I should exercise regularly during my pregnancy. [injunctive]

Question 8: My friends think that I should exercise regularly during my pregnancy. [injunctive]

Question 30: My husband/partner thinks that I should exercise regularly during my pregnancy. [injunctive]

Question 38: Exercise professionals (e.g. fitness instructors) think that I should exercise regularly during my pregnancy. [injunctive]

Question 23: Most pregnant women will themselves exercise regularly during their pregnancy. [descriptive]

“Motivation to comply” with each referent (in the case of injunctive norms) and “identifying” with the normative referent (in the case of descriptive norms) was assessed on a 7-point Likert scale ranging from 1 (not at all) to 7 (very much).

Question 47: When it comes to my pregnancy, I want to do what health professionals (e.g. my midwife) think I should do. [motivation to comply]

Question 36: When it comes to my pregnancy, I want to do what my family thinks I should do. [motivation to comply]

Question 27: When it comes to my pregnancy, I want to do what my friends think I should do. [motivation to comply]

Question 41: When it comes to my pregnancy, I want to do what my husband/partner thinks I should do. [motivation to comply]

Question 15: When it comes to my pregnancy, I want to do what exercise professionals (e.g. fitness instructors) think I should do. [motivation to comply]

Question 32: What other pregnant women do during their pregnancy is important to me. [identification]

Scoring “Method A”: Each “normative belief” score was multiplied by the corresponding “motivation to comply” or “identification” score and the resulting products summed across all the items to create a normative beliefs score:

$$\Sigma = (Q21 \times Q47) + (Q52 \times Q36) + (Q8 \times Q27) + (Q30 \times Q41) + (Q38 \times Q15) + (Q23 \times Q32)$$

Scoring “Method B”: “Normative belief” scores were summed across all the items to create a normative beliefs score:

$$\Sigma = (Q21) + (Q52) + (Q8) + (Q30) + (Q38) + (Q23)$$

## **Perceived Behavioural Control**

### **A. Direct measurement of PBC**

The direct measurement of PBC should capture an individual's confidence in their ability to perform a certain behaviour (Francis et al., 2004; Ajzen, 2002). Specifically, the concept of PBC reflects people's expectations about the extent to which they are capable of engaging in a specific behaviour, the perception that they have the necessary resources to carry out the behaviour, and the conviction that they can overcome any obstacles that may hinder their performance of the behaviour (Fishbein & Ajzen, 2010). Whilst researchers such as Terry and O'Leary (1995) and Armitage and Conner (1999) have suggested that PBC represents two distinct factors, one representing self-efficacy expectations and the other perceptions of behavioural control, Fishbein and Ajzen (2010) maintain that the construct of PBC is theoretically equivalent to Bandura's (1977; 1989) concept of self-efficacy and that both of these factors refer to the same latent construct. Furthermore, Fishbein and Ajzen (2010) identifies inconsistencies in the way questions are contextualised that could account for the observed two-factor structure; that is, in some cases respondents are asked to consider the issue of control in relation to either a single behavioural focus (i.e. performance of the behaviour) whereas in other cases a behavioural comparison (i.e. performing the behaviour and not performing the behaviour) is used. Nonetheless, they do accept that PBC comprise of two subcomponents, which they've labelled "capacity" and "autonomy", but caution that these should not be compared as indicators of either self-efficacy or perceived control (p. 166). Thus, analogous to the measurement of attitudes by way of instrumental and experiential items, and the measurement of subjective norm by means of injunctive and descriptive norms, a comprehensive measure of PBC consists of items representing both perceived capacity and perceived autonomy (Fishbein & Ajzen, 2010).

At the outset, the direct measurement of PBC in this study consisted of four items. Consistent with Ajzen and Fishbein's (2010, p. 167) recommendations, both "perceived capacity" and "perceived autonomy" items were included in the questionnaire. Participants were asked to rate each item using a 7-point Likert scale.

Question 24: I am confident that I can exercise regularly during my pregnancy. [capacity]

Disagree    1    2    3    4    5    6    7    Agree

Question 48: For me to do regular exercise during my pregnancy is: [capacity]

Easy    1    2    3    4    5    6    7    Difficult

Question 9: The decision to exercise regularly during my pregnancy is under my control.  
[autonomy]

Disagree    1    2    3    4    5    6    7    Agree

Question 42: Whether I exercise regularly during my pregnancy is entirely up to me.  
[autonomy]

Disagree    1    2    3    4    5    6    7    Agree

The four items included in the initial measurement showed an undesirable level of internal consistency ( $\alpha = .66$ ). Following inspection and subsequent removal of Question 42, the reliability of the scale improved to an acceptable level ( $\alpha = .72$ ; cf. Pallant, 2016). It should be noted that had Question 9 also been removed from the scale, the internal consistency would have improved further, therefore, items representing perceived capacity had a good level of internal consistency ( $\alpha = .79$ ). However, as Question 9 is the only item measuring perceived autonomy and the scale now had acceptable internal consistency, it was retained to provide a single index of PBC. Items were recoded so that higher numbers reflected a greater perception

of control towards exercise behaviour. The mean of the item scores represented an overall PBC score.

### B. Control beliefs

Control beliefs represent people's perception of the factors that enable or prevent them from engaging in a specific behaviour (Ajzen, 2005). Together these beliefs lead individuals to ascertain whether they have the ability to perform the behaviour in question (Fishbein & Ajzen, 2010). The likelihood of a certain control factor being present (control belief strength) and the degree to which its occurrence could potentially influence performance of the behaviour (perceived power of the control factor), provides an indication of the individual's general perception of control over the behaviour (Fishbein & Ajzen, 2010). Similar to the relationship between attitudes and behavioural beliefs, the relationship between PBC and control beliefs can also be considered in terms of an expectancy-value formula:

$$PBC = \sum c_i p_i$$

Where, PBC is perceived behavioural control,  $c_i$  is the belief that control factor  $i$  will be present;  $p_i$  is the power of control factor  $i$  to facilitate or hinder performance of the behaviour; and the sum is over the number of accessible control beliefs (Ajzen, 2002; 2005).

The modal salient control beliefs identified in Study One were converted into a set of statements representing the control factors affecting the exercise behaviour of the pregnant women in East Kent (see Table 4.4). "Control belief strength" was assessed with five items relating to the control factor's presence; participants were asked to rate four of the items using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) and one item ranging from 1 (extremely likely) to 7 (extremely unlikely).

Question 50: I have adequate access to suitable facilities/groups/classes which allow me to exercise regularly during my pregnancy.

Question 10: I have adequate knowledge about exercising during pregnancy.

Question 4: I have adequate funds (or financial support) available which enable me to exercise regularly during my pregnancy.

Question 13: Exercise provision in my community is suitable for pregnant women.

Question 31: How likely is it that you will have the time available to exercise regularly during your pregnancy?

The “perceived power of the control factor” to influence pregnant women’s exercise behaviour was assessed by pregnant women’s agreement with a statement relating to the impact of the identified control factors; participants were asked to rate the five items on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Question 7: Having access to suitable facilities/groups/classes will enable me to exercise regularly during my pregnancy.

Question 22: Having adequate knowledge about physical activity during pregnancy will enable me to exercise regularly during my pregnancy.

Question 45: Having adequate funds (or financial support) available will enable me to exercise regularly during my pregnancy.

Question 53: Suitable exercise provision for pregnant women in my community will enable me to exercise regularly during my pregnancy.

Question 26: Having more time available will enable me to exercise regularly during my pregnancy.

Scoring: Items were recoded so that higher numbers reflected an increased perception of control with regards to exercise behaviour. Each “control belief” score was multiplied by the corresponding “perceived power to influence behaviour” score and the resulting products summed across all the items to create a control beliefs score:

$$\Sigma = (Q50 \times Q7) + (Q10 \times Q22) + (Q4 \times Q45) + (Q13 \times Q53) + (Q31 \times Q26)$$

### **5.3 Results**

The IBM SPSS (version 22.0) software package were used to calculate and report the statistical findings presented here.

#### **5.3.1 Sample characteristics**

Of the 164 pregnant women who agreed to participate, 116 returned their “Time 1” questionnaires (i.e. the response rate from recruitment to “Time 1” was 71%) and 89 completed the study (i.e. the response rate from “Time 1” to “Time 2” was 77%). Following initial screening of data, 7 cases were removed from the study; 2 sets of questionnaires had missing or incomplete data, 3 participants completed the questionnaire incorrectly, 1 data set displayed ‘response set’ answers, and 1 participant revealed that she was expecting twins and therefore did not meet the inclusion criteria.

The majority of participants described themselves as being of white ethnicity ( $n = 77$ ), having English ( $n = 53$ ) or British ( $n = 19$ ) nationality, and with English being their first language ( $n = 73$ ). Participants had an average age of 29.25 years ( $SD = 4.88$ ) with most women being married ( $n = 46$ ) and in full or part-time employment ( $n = 62$ ). Most participants ( $n = 52$ ) reported having attained a Level 4 education (i.e. certificate of higher education) or above. The

reported average annual household income (i.e. representing the total income from all people living in the same household) of the sample was £41,560.61 (n = 66). Nearly half of the participants were recruited during their second trimester of pregnancy (n = 41) with the average gestational age being 25 weeks. For 35 of the participants this was their first pregnancy. Most participants (n = 54) reported taking part in physical activity on a regular basis in the 12 months prior to their pregnancy whilst 44 participants reported that they were exercising regularly during their current pregnancy. Of those who completed the study, 49 selected to receive a £10 high-street shopping voucher whilst the remaining 40 elected for a £10 donation to be made on their behalf to the charity Tommy's.

### **5.3.2 PPAQ**

Total values (MET hours per week) were obtained according to Chasan-Taber and colleagues' (2004) guidelines for calculating scores. Mean values were then compared between "Time 1" and "Time 2" using a paired samples t-test. Statistically significant decreases in scores were noted for total activity [t (81) = 4.21, p < .001], sedentary activity [t (81) = 2.28, p < .05], light intensity activity [t (81) = 3.39, p < .01], moderate intensity activity [t (81) = 3.15, p < .01], and occupational activity [t (81) = 5.46, p < .001]. Scores for vigorous activity, household/caregiving activity, and sport and exercise activities did not significantly change between "Time 1" and "Time 2". These results are summarised in Table 5.1.



Table 5.1: PPAQ difference in scores between Time 1 and Time 2 (n = 82).

Pair	Variable	Mean	SD	t	Sig. (2-tailed)
1	Total activity	301.28	123.76	4.21	.000
		252.25	113.10		
2	Sedentary activity	68.32	31.18	2.28	.026
		61.14	30.48		
3	Light intensity activity	119.50	57.44	3.39	.001
		104.94	50.83		
4	Moderate intensity activity	110.94	93.91	3.15	.002
		83.54	75.53		
5	Vigorous activity	2.43	4.82	-.51	.614
		2.64	5.08		
6	Household/caregiving activity	117.88	77.48	1.52	.132
		110.82	72.65		
7	Occupational activity	96.11	89.31	5.47	.000
		53.73	60.68		
8	Sport and exercise activity	13.30	10.53	-.10	.922
		13.39	11.02		

Thus, as expected, pregnant women’s total activity decreased as pregnancy progressed. Specifically, results indicate that occupational, light intensity and moderate intensity activities reduced and that pregnant women became less sedentary by an average of 7.18 MET hours per week. The fact that expecting mothers’ sedentary behaviour reduced could be explained by the significant decrease in occupational activity; as pregnant women reduced their working hours or commenced with maternity leave and therefore spent less time at work, they spent less time sitting. Indeed, upon further inspection it was revealed that 16 pregnant women had changed their working status between the completion of “Time 1” and “Time 2” questionnaires.

### 5.3.3 TPB

The recommended statistical procedure for examining the predictive utility of the TPB is hierarchical regression analysis (HRA; Ajzen, 1991). However, as regression analysis is very sensitive to outliers, an initial regression run was carried out to identify cases poorly fit by the model (Tabachnik & Fidell, 2014). Inspection of residuals and Mahalanobis distances identified five potential cases as outliers. Following inspection, four of these were removed and excluded from the subsequent analyses. The remaining sample size ( $n = 78$ ) had adequate power (based on a power of .80 and an alpha of .05) to conduct regression analyses with two and three predictor variables (Green, 1991;  $N > 50 + 8m$ , where  $m$  is the number of independent variables).

Multivariate analysis of variance (MANOVA) was used in the first instance to compare sample characteristics across the TPB constructs (or dependent variables i.e. behaviour, intention, attitude, subjective norm and PBC). The data set was screened for normality, linearity, homoscedasticity, and multicollinearity, with no serious violations noted. No group differences were found for the independent variables of marital status, employment status, level of education, pregnancy viability ( $\geq 24$  WEEKS), gravidity (number of times a woman has been pregnant), and previous pregnancy complications. There was not enough data to examine group differences between all three trimesters, however no group differences were found between trimesters two and three.

There was, however, a statistically significant difference between pregnant women who reported participating in regular physical activities in the 12 months before pregnancy ( $n = 52$ ) compared to those who did not ( $n = 25$ ),  $F(5, 71) = 2.99$ ,  $p = .017$ ; Wilks' Lambda = .83 (Pillai's Trace = .17); partial eta squared = .17 [Bonferroni adjustment:  $p < .01$ ; statistically

significant differences were noted for behaviour ( $p = .001$ ; partial eta squared = .137 or 13.7%), attitude ( $p = .009$ ; partial eta squared = .088 or 8.8%), and PBC ( $p = .009$ ; partial eta squared = .087 or 8.7%).

An independent samples t-test was then conducted to compare the light, moderate, and vigorous intensity activities between pregnant women who reported participating in regular exercise in the 12 months prior to pregnancy and those who did not. There was a significant difference between the vigorous intensity activities performed by pregnant women who reported that they exercised regularly before pregnancy ( $M = 3.27$ ,  $SD = 5.59$ ) and those who indicated that they did not [ $M = .86$ ,  $SD = 2.37$ ;  $t(74.19) = 2.65$ ,  $p = .01$ , two tailed]. The magnitude of the differences in the mean scores (mean difference = 2.41, 95% CI: -35.13 to 22.62) was moderate to large (eta squared = .09 or 9%; cf. Cohen, 1988). There was no significant difference between light and moderate intensity activities.

A difference was also noted between those who reported participating in regular exercise during their pregnancy ( $n = 43$ ) and those who indicated that they did not ( $n = 34$ ),  $F(5, 71) = 7.87$ ,  $p = .000$ ; Wilks' Lambda = .64; (Pillai's Trace = .36); partial eta squared = .36. Significant group differences were detected across all of the TPB measures, with women exercising regularly during their pregnancy scoring higher on all of the measures compared to women not taking part in physical activities [Bonferroni adjustment:  $p < .01$ ; behaviour ( $p = .000$ ; partial eta squared = .31 or 31%), intention ( $p = .000$ ; partial eta squared = .213 or 21.3%), attitude ( $p = .001$ ; partial eta squared = .128 or 12.8%), subjective norm ( $p = .002$ ; partial eta squared = .125 or 12.5%) and PBC ( $p = .000$ ; partial eta squared = .184 or 18.4%)].

An independent samples t-test was then conducted to compare the light, moderate, and vigorous intensity activities of pregnant women who reported taking part in regular exercise during their pregnancy compared to those who indicated that they did not. There was a significant difference between the moderate intensity activities performed by pregnant women who reported that they exercised regularly pregnancy ( $M = 126.18$ ,  $SD = 108.39$ ) and those who indicated that they did not [ $M = 85.84$ ,  $SD = 63.53$ ;  $t(69.68) = 2.04$ ,  $p = .05$ , two tailed]. The magnitude of the differences in the mean scores (mean difference = 40.34, 95% CI: .86 to 79.83) was moderate (eta squared = .05 or 5%; cf. Cohen, 1988). There was also a significant difference between the vigorous intensity activities performed by pregnant women who reported that they exercised regularly during pregnancy ( $M = 3.95$ ,  $SD = 5.93$ ) and those who indicated that they did not [ $M = .63$ ,  $SD = 2.05$ ;  $t(54.12) = 3.42$ ,  $p = .001$ , two tailed]. The magnitude of the differences in the mean scores (mean difference = 3.32, 95% CI: 1.37 to 5.27) was large (eta squared = .13 or 13%; cf. Cohen, 1988). There was no significant difference between light intensity activities.

Pearson correlations were next examined to assess the strength of the relationships among the TPB constructs. These product-moment correlation coefficients are presented in Table 5.2. In terms of the original TPB, intention ( $r = .75$ ;  $p < .01$ ) and PBC ( $r = .47$ ;  $p < .01$ ) had the strongest associations with exercise behaviour. PBC ( $r = .56$ ;  $p < .01$ ) had the strongest correlation with intention, however, both attitude ( $r = .51$ ;  $p < .01$ ) and subjective norm ( $r = .53$ ;  $p < .01$ ) revealed strong relationships with intention (cf. Cohen, 1988). Thus, analogous to the meta-analysis by De Vivo et al. (2016), this study confirms the existence of a strong relationship between intention and behaviour and a medium relationship between PBC and exercise behaviour. However, whilst similar strong relationships were observed between the

theory variables (attitude, subjective norm, PBC) and intention, PBC as opposed to attitude had the strongest association with pregnant women’s motivation to be physically active.

Table 5.2: Pearson Correlations (r) between variables

N = 78	Behaviour	Intention	Attitude	Subjective Norm	PBC	Past Behaviour	Behavioural Beliefs	Normative Beliefs A	Normative Beliefs B	Control Beliefs
Behaviour	1									
Intention	.75**	1								
Attitude	.40**	.51**	1							
Subjective Norm	.35**	.53**	.55**	1						
PBC	.47**	.56**	.65**	.53**	1					
Past Behaviour	.79**	.91**	.45**	.48**	.60**	1				
Behavioural Beliefs	.17	.30**	.72**	.53**	.45**	.25*	1			
Normative Beliefs A	.37**	.50**	.56**	.80**	.45**	.41**	.52**	1		
Normative Beliefs B	.38**	.55**	.65**	.85**	.59**	.51**	.57**	.84**	1	
Control Beliefs	.27*	.45**	.64**	.56**	.62**	.44**	.56**	.56**	.62**	1

\*\*Correlation is significant at the 0.01 level (2-tailed).

\*Correlation is significant at the 0.05 level (2-tailed).

Small r = .10 to .29; medium r = .30 to .49; large r = .50 to 1.0; Cohen, 1988)

The concurrent validity of direct measures was assessed by association with their corresponding belief index; behavioural beliefs was significantly correlated with attitude ( $r = .72$ ;  $p < .01$ ) and control beliefs was significantly correlated with PBC ( $r = .62$ ;  $p < .01$ ). In terms of the relationship between normative beliefs and subjective norm, both methods for

determining normative beliefs were significantly correlated with the subjective norm construct. However, normative beliefs as determined by “Method B” had the strongest association with subjective norm ( $r = .85$ ;  $p < .01$ ). Thus, the beliefs elicited in this study accurately represented the true beliefs of pregnant women in East Kent.

When considering past behaviour alongside the original variables, past behaviour had a strong association with exercise behaviour ( $r = .79$ ;  $p = <.01$ ), intention ( $r = .91$ ;  $p = <.01$ ), and PBC ( $r = .60$ ;  $p = <.01$ ), and a medium correlation with attitude ( $r = .45$ ;  $p = <.01$ ), and subjective norm ( $r = .48$ ;  $p = <.01$ ). Although it is acknowledged that high correlations may be an indication of multicollinearity, neither the Tolerance values nor Variance inflation factors (VIF) in any of the independent variables approached the cut-off points (cf. Pallant, 2016). Furthermore, Tabachnick and Fidell (2014) suggests that collinearity can be ignored where the purpose of analysis is prediction or in studies where repeated measures of the same variable occur. In this application of the TPB, past behaviour, intention, and ultimate behaviour were all measured on the same scale to ensure compatibility.

Given the observed group differences based on the influence of past behaviour, both distal (out of context) and proximal (within context), the main hypotheses concerning the predictive utility of the TPB were considered in relation to three scenarios:

1. The TPB in its original form,
2. Controlling statistically for the influence of past behaviour, and
3. Using past behaviour as an additional variable.

To examine the main hypotheses concerning the predictive utility of the TPB in the first scenario, two separate forced hierarchical regression analysis (HRA) were performed. The

content and order in which the blocks were entered were based on the theoretical principles of the TPB (Ajzen, 1991). These results are summarised in Table 5.3.

Table 5.3: HRA for the original TPB.

Variable	R <sup>2</sup>	F	ΔR <sup>2</sup>	ΔF	Beta	Part r
<b>Predicting behaviour</b>						
Block 1: 1. Intention	.561	96.981**			.749**	
Block 2: 1. Intention 2. PBC	.564	48.491**	.003	.561	.710** .069	.590 .057
Block 3: 1. Intention 2. PBC 3. Attitude 4. Subjective Norm	.570	24.184**	.006	.510	.743** .098 .007 -.099	.575 .069 .005 -.076
<b>Predicting intention</b>						
Block 1: 1. Attitude 2. Subjective Norm	.351	20.250**			.309* .363*	.259 .303
Block 2: 1. Attitude 2. Subjective Norm 3. PBC	.401	16.536**	.051	.6.266*	.152 .286* .308*	.110 .230 .225

\*\*Significant at the .001 level.

\*Significant at the .05 level.

In the first HRA, exercise behaviour (dependent variable) was regressed on intention (Block 1), followed by PBC (Block 2), and attitude and subjective norm (Block 3). Results showed that intention (Block 1) explained 56.1% of the variance in pregnant women's exercise behaviour,  $F(1, 76) = 96.98, p < .001$ . PBC (Block 2) explained an additional 0.3% of the variance,  $F(2, 75) = 48.49, p < .001$ , however whilst intention was a significant predictor of exercise behaviour ( $\beta = .71, p < .001$ ), PBC was not ( $\beta = .07, p = .46$ ). The addition of attitude and subjective norm (Block 3) explained a further 0.6% of the variance in exercise behaviour,  $F(4, 73) = 24.18, p < .001$ , with only intention making a unique statistically significant

contribution ( $\beta = .74, p < .001$ ). This final model indicates that intention uniquely explains 33.1% of the variance in pregnant women's exercise behaviour (Part Correlation = .575).

In the second HRA, intention (dependent variable) was regressed on attitude and subjective norm (Block 1), followed by PBC (Block 2). Together attitude and subjective norm (Block 1) explained 35.1% of the variance in pregnant women's intention to be physically active,  $F(2, 75) = 20.25, p < .001$ , with both attitude ( $\beta = .31, p < .01$ ) and subjective norm ( $\beta = .368, p < .01$ ) making unique statistically significant contributions. PBC (Block 2) explained an additional 5.1% of the variance in pregnant women's exercise intentions,  $F(3, 74) = 16.54, p < .001$ , with subjective norm ( $\beta = .29, p < .05$ ) maintaining its unique contribution and PBC ( $\beta = .31, p < .05$ ) providing an additional unique contribution. Attitude, however, failed to maintain a unique contribution ( $\beta = .15, p = .23$ ). This final model indicates that subjective norm uniquely explained 5.29% of the variance in pregnant women's exercise intention (Part Correlation = .230) whilst PBC indicated a unique contribution of 5.06% (Part Correlation = .225).

To examine the main hypotheses concerning the predictive utility of the TPB in the second scenario, two separate hierarchical regression analysis (HRA) were performed to assess the ability of original TPB constructs to predict the exercise behaviour and intention of pregnant women, after regulating the influence of past behaviour. Here the influence of "past behaviour" was statistically controlled for by entering it into the first block of the HRA. These results are summarised in Table 5.4.



Table 5.4: HRA for TPB when controlling for past behaviour.

Variable	R <sup>2</sup>	F	ΔR <sup>2</sup>	ΔF	Beta	Part r
<b>Predicting behaviour</b>						
Block 1: 1. Past behaviour	.629	128.80**			.793**	
Block 2: 1. Past behaviour 2. Intention	.633	64.66**	.004	.820	.653** .154	.269 .063
Block 3: 1. Past behaviour 2. Intention 3. PBC	.633	42.56**	.000	.028	.660** .155 -.015	.263 .064 -.012
<b>Predicting intention</b>						
Block 1: 1. Past behaviour	.830	372.19**			.911**	
Block 2: 1. Past behaviour 2. Attitude 3. Subjective norm	.846	135.92**	.016	3.85*	.832** .087 .083	.704 .070 .066
Block 3: 1. Past behaviour 2. Attitude 3. Subjective Norm 4. PBC	.850	103.03**	.003	1.52	.860** .122 .094 -.083	.669 .088 .073 -.056

\*\*Significant at the .001 level.

\*Significant at the .05 level.

In the first HRA, exercise behaviour (dependent variable) was regressed on past behaviour (Block 1), followed by intention (Block 2), and PBC (Block 3). Results showed that past behaviour (Block 1) explained 62.9% of the variance in pregnant women's exercise behaviour,  $F(1, 76) = 128.80, p < .001$ . After entry of intention (Block 2), the total variance explained by the model as a whole was 63.3%,  $F(2, 75) = 64.66, p < .001$ , however, the additional contribution provided by intention was not statistically significant,  $R^2$  change = .004,  $F$  change (1, 75) = .82,  $p = .37$ . Following the addition of PBC (Block 3), the model as a whole remained significant,  $F(3, 74) = 42.56, p < .001$ , however, PBC did not explain any further variance in exercise behaviour,  $R^2$  change = .000,  $F$  change (1, 74) = .03,  $p = .87$ .

In the second HRA, intention (dependent variable) was regressed on past behaviour (Block 1), followed by attitude and subjective norm (Block 2), and PBC (Block 3). Past behaviour (Block 1) explained 83% of the variance in pregnant women's intention to be physically active,  $F(1, 76) = 372.19, p < .001$ . After entry of attitude and subjective norm (Block 2), the model as a whole explained 84.6% in variance,  $F(3, 74) = 135.92, p < .001$ , however, whilst the additional contribution provided by attitude and subjective norm was significant,  $R^2$  change = .016,  $F$  change (2, 74) = 3.85,  $p < .05$ , neither attitude ( $\beta = .09, p = .13$ ) nor subjective norm ( $\beta = .08, p = .16$ ) made any unique contributions. Following the addition of PBC (Block 3), the model as a whole remained significant,  $F(4, 73) = 103.03, p < .001$ , however, PBC did not contribute significantly to the prediction of intention,  $R^2$  change = .003,  $F$  change (1, 73) = 1.52,  $p = .22$ .

To examine the main hypotheses concerning the predictive utility of the TPB in the third scenario, two separate hierarchical regression analysis (HRA) were performed. Here "past behaviour" was considered as an additional variable and entered in the last block of the HRA. These results are summarised in Table 5.5.

In the first HRA, exercise behaviour (dependent variable) was regressed on intention (Block 1), followed by PBC (Block 2), and past behaviour (Block 3). Results showed that intention (Block 1) explained 56.1% of the variance in pregnant women's exercise behaviour,  $F(1, 76) = 96.98, p < .001$ . After entry of PBC (Block 2), the model as a whole explained 56.4% of the variance in exercise behaviour,  $F(2, 75) = 48.49, p < .001$ , however, the additional contribution provided by PBC was not statistically significant,  $R^2$  change = .003,  $F$  change (1, 75) = .56,  $p = .46$ . Only intention provided a unique statistically significant contribution ( $\beta = .71, p < .001$ ) to the variance explained by the model. Following the addition of past behaviour

(Block 3), the model as a whole explained 63.3% in variance,  $F(3, 74) = 42.56, p < .001$ . This additional contribution added significantly to the prediction of exercise behaviour,  $R^2$  change = .069,  $F$  change  $(1, 74) = 13.95, p < .001$ , however, intention failed to maintain its unique contribution ( $\beta = .16, p = .37$ ) and only past behaviour made a unique statistically significant contribution ( $\beta = .66, p < .001$ ). This final model indicates that past behaviour uniquely explains 6.92% of the variance in pregnant women's exercise behaviour (Part Correlation = .263).

Table 5.5: HRA for TPB with past behaviour as an additional variable

Variable	R <sup>2</sup>	F	$\Delta R^2$	$\Delta F$	Beta	Part r
<b>Predicting behaviour</b>						
Block 1: 1. Intention	.561	96.981**			.749**	
Block 2: 1. Intention 2. PBC	.564	48.491**	.003	.561	.710** .069	.590 .057
Block 3: 1. Intention 2. PBC 3. Past behaviour	.633	42.556**	.069	13.946**	.155 -.015 .660**	.064 -.012 .263
<b>Predicting intention</b>						
Block 1: 1. Attitude 2. Subjective Norm	.351	20.250**			.309* .363*	.259 .303
Block 2: 1. Attitude 2. Subjective Norm 3. PBC	.401	16.536**	.051	.6.266*	.152 .286* .308*	.110 .230 .225
Block 3: 1. Attitude 2. Subjective Norm 3. PBC 4. Past behaviour	.850	103.026**	.448	217.41**	.122 .094 -.083 .860**	.088 .073 -.056 .669

\*\*Significant at the .001 level.

\*Significant at the .05 level.

In the second HRA, intention (dependent variable) was regressed on attitude and subjective norm (Block 1), followed by PBC (Block 2), and past behaviour (Block 3). Together attitude and subjective norm (Block 1) explained 35.1% of the variance in pregnant women's intention to be physically active,  $F(2, 75) = 20.25, p < .001$ , with both attitude ( $\beta = .31, p < .01$ ) and subjective norm ( $\beta = .36, p < .01$ ) making unique statistically significant contributions. After entry of PBC (Block 2), the model as a whole explained 40.1% of the variance in exercise behaviour,  $F(3, 74) = 16.54, p < .001$ . The additional contribution provided by PBC was statistically significant,  $R^2 \text{ change} = .051, F \text{ change}(1, 74) = 6.23, p < .05$ , with subjective norm ( $\beta = .29, p < .05$ ) maintaining its unique contribution and PBC ( $\beta = .31, p < .05$ ) providing an additional unique contribution. Attitude, however, failed to maintain a unique contribution ( $\beta = .15, p = .23$ ). Following the addition of past behaviour (Block 3), the model as a whole explained 85% of the variance in pregnant women's exercise intentions,  $F(4, 73) = 103.03, p < .001$ . The additional contribution of past behaviour added significantly to the prediction of intention,  $R^2 \text{ change} = .448, F \text{ change}(1, 73) = 217.41, p < .001$ , with only past behaviour providing a unique statistically significant contribution ( $\beta = .86, p < .001$ ). Neither subjective norm ( $\beta = .09, p = .11$ ) nor PBC maintained their respective unique contributions ( $\beta = -.08, p = .22$ ). This final model indicates that past behaviour uniquely explained 44.8% of the variance in pregnant women's exercise intention (Part Correlation = .669).

#### **5.4 Discussion**

The main aim of this study was to evaluate the effectiveness of the TPB in predicting the intentions and exercise behaviour of pregnant women in East Kent. In addition, given the uncertainty regarding the role of past behaviour, its influence within the context of pregnancy

was examined. Specifically, it was hypothesized that: (1) concerning the original TPB, intention will be the strongest determinant of exercise behaviour, and attitude will be the strongest determinant of intention; (2) when controlling for past behaviour, the influence of intention and PBC on future behaviour will be attenuated with unique influences remaining, and the influence of attitudes, subjective norms and PBC on intentions will be attenuated with unique influences remaining; and (3) when adding past behaviour as additional variable, the model will explain significantly more variance in pregnant women's exercise intentions and behaviour.

Firstly, as predicted, when considering the original TPB as conceptual framework, intention emerged as the strongest determinant of pregnant women's exercise behaviour. Together, intention and PBC explained 56.4% of the variance in pregnant women's exercise behaviour, however, only intention emerged as a significant predictor. This finding reflects that of Symons Downs and Hausenblas (2005) regarding exercise behaviour in general and Symons Downs and Hausenblas (2003; 2007) who found pregnant women's motivation to be physically active rather than their perception of control to influence behaviour. Here it could be argued that the influence of PBC on pregnant women's exercise behaviour may not be particularly realistic. Ajzen (2005) advises that the association between PBC and behaviour will only transpire when an individual's perception of control matches their actual control over the behaviour of interest. It may thus be the case that pregnant women find themselves faced with uncertainty regarding the factors that may enable or prevent them from initiating or continuing with regular physical activities. Specifically, in Study One pregnant women identified access and availability, time, knowledge, cost, exercise format, health issues, fatigue and dependants as pertinent factors that could thwart actual control over the behaviour.

Whilst PBC did not directly influence exercise behaviour in this study, it did play an important role in the formation of pregnant women's intention to exercise. Together the three determinants of intention explained 40.2% of the variance in pregnant women's exercise motivation, with subjective norm and PBC providing unique contributions. Contrary to the hypothesis, attitude failed to provide a unique contribution and subjective norm emerged as marginally stronger in predicting intention than PBC. This finding is similar to Symons Downs and Hausenblas (2007) who reported subjective norm as the strongest predictor of exercise intention during the third trimester and reflects the findings of Hausenblas and Symons Downs (2004) who report subjective norm as a significant predictor of exercise intention during the first trimester of pregnancy. Furthermore, Symons Downs and Hausenblas (2003) note that in their study of second trimester exercise intentions and behaviour, attitude was only marginally stronger in predicting intention than PBC.

PBC is a social cognitive construct that is likely to account for some of the factors that may realistically prevent or enable individuals to perform a certain behaviour (Ajzen, 2005). The perceived ease or difficulty with which pregnant women in East Kent can engage in physical activities emerged as an important determinant of their motivation (or willingness) to participate in regular exercise. This finding reflects that of Black, Kieffer, Villarruel, and Sinco, (2007, p. 8) who showed that "ability to overcome environmental barriers" and "ability to overcome personal barriers" predicted the exercise intention of pregnant Latina women (N = 98). Consequently, to understand why pregnant women hold certain perceptions of control and to ultimately produce a change in PBC, it is necessary to consider the cognitive foundations underlying this determinant (Ajzen, 2005). In this study control beliefs were strongly correlated with the direct measure of PBC thereby suggesting that pregnant women's perception of their capacity to participate in regular physical activities were accurately

represented. Thus, redressing some of these control beliefs or making available new beliefs may lead to changes in pregnant women's perceptions of autonomy and control (Ajzen, 2005).

The fact that subjective norm predicted pregnant women's physical activity intentions is in contrast to the meta-analysis of Symons Downs and Hausenblas (2005) who found that subjective did not predict exercise intentions in the exercise domain. However, it should be noted that the present study included measures of injunctive and descriptive norms which has not always been the case with studies involving the TPB. In his meta-analysis concerning the effect of subjective norms on behaviour in the TPB, Manning (2010) "supports the distinction between descriptive norms and injunctive norms and underscores the recommendation to include both types of norms in planned behaviour research" (p. 687). Future studies investigating pregnant women's exercise intentions should therefore also aim to include a higher-order construct that represents both injunctive and descriptive norms.

Reflecting the findings of De Vivo et al. (2016), the present study showed that pregnant women's perception of the social pressure to participate (or not to participate) in regular physical activity is an important factor in determining their motivation to engage with the behaviour. In accordance with TPB principles, any intervention that is aimed at influencing social norms should address the corresponding salient normative beliefs as they provide the cognitive foundation on which the determinant is based (Ajzen, 2005). Thus, in order to assess whether elicited beliefs accurately represent the perceptions of the population under investigation, it is necessary for normative beliefs to correlate with the direct measure of subjective norm (Fishbein & Ajzen, 2010). Results of the present study confirm a strong relationship between normative beliefs and subjective norm. Specifically, normative beliefs as calculated by both the expectancy-value formulation (Method A) and summation of normative

beliefs item scores (Method B) were found suitable, however, “Method B” was most strongly correlated with subjective norm and proved superior to “Method A” in calculating normative beliefs.

Secondly, controlling for past behaviour attenuated the influence of intention and PBC on behaviour with neither of the original variables providing a unique influence, thus past behaviour within context directly influenced future behaviour. A parallel outcome has previously been reported by Norman and Smith (1995) who studied exercise behaviour in a group of undergraduate psychology students (N = 83). The authors found that past behaviour directly influenced the students’ exercise behaviour as measured six months after the completion of their first questionnaire. The current findings echo those of Zamora-Flyr’s (2010) within the pregnancy context. Zamora-Flyr (2010) defined exercise behaviour as walking and found that within the original TPB, intention was the only independent predictor of future walking behaviour. However, the addition of past walking behaviour extinguished the effects of intention and past behaviour emerged as the only predictor of future walking behaviour. Controlling for past behaviour in this study also attenuated the influence of attitude, subjective norms and PBC on intention with not any of the original variables providing a unique influence. Thus, contrary to the hypothesis, this finding supports a direct relationship between past behaviour and intention.

Thirdly, consistent with the hypothesis, the addition of past behaviour led to an increase in the predictive utility of the TPB. Together intention, PBC and past behaviour explained 63.3% of the variance in pregnant women’s exercise behaviour, with only past behaviour making a unique statistically significant contribution. When combined, attitude, subjective norm, PBC and past behaviour explained 85% of the variance in pregnant women’s exercise intention, with only past behaviour providing a unique statistically significant contribution. However, given



the fact that past behaviour also had a strong relationship with PBC ( $r = .60$ ;  $p < .01$ ) and a medium relationship with attitude ( $r = .45$ ;  $p < .01$ ) and subjective norm ( $r = .48$ ;  $p < .01$ ), it is not unreasonable to suggest that these constructs also act indirectly in predicting pregnant women's exercise intentions. Indeed, Yordy and Lent (1993) suggest that TPB "variables may serve as partial link between past behaviour and future exercise participation" (p. 371).

Contrasting McEachan and colleagues' (2011) findings in the health domain where past behaviour was the most important predictor of behaviour but not intention, the influence of past behaviour in this study was most notable in the prediction of pregnant women's exercise intentions, uniquely explaining 45% of the variance observed. Thus, it could be argued that regularly engaging in physical activity during pregnancy reduces cognitive deliberation over whether to maintain an exercise regime as pregnancy progresses; active pregnant women may simply be adapting existing routines rather than deliberating whether they should be exercising. Yordy and Lent (1993) suggest that regular exercisers may previously have developed strategies for dealing with common barriers, for example, pregnant women may already have childcare arrangements in place which allows them to exercise regularly. Furthermore, it is also possible that pregnant women who were already participating in a specific type of exercise (e.g. walking), may have continued to do so without the need for any contemplation.

Similarly to Symons Downs and Hausenblas (2007), the influence of past behaviour was also observed when group differences between regular exercisers and non-exercisers were examined. Within the stable context of pregnancy, regular exercisers scored significantly higher across all of the TPB measurements with the greatest differences noted in intention (21.3%) and future behaviour (31%). However, pre-pregnancy exercise behaviour had a lesser effect on pregnancy exercise behaviour (i.e. unstable context); statistically significant

differences between TPB measures were noted for behaviour (13.7%), attitude (8.8%), and PBC (8.7%). Thus, it would appear that distal past behaviour (out of context) has less of an influence on TPB measurements compared to proximal past behaviour (within context). Nonetheless, in a review of the patterns and determinants of exercise during pregnancy, Gaston and Cramp (2011) reported that six of the seven studies included in their review observed a significant relationship between pre-pregnancy and pregnancy exercise behaviour, that is, women who were active before pregnancy remained more active during their pregnancy. These findings are important in terms of the routine care that pregnant women receive. In particular, those who indicate at their first booking appointment that they are regularly taking part in physical activity should be supported in maintaining and/or adapting their exercise regime as pregnancy progresses. For those who are not exercising, this could be the ideal opportunity to address concerns, improve knowledge and increase confidence. To this extent, Phelan (2010) identify pregnancy as a powerful teachable moment as regular contact with healthcare providers could be utilized to promote healthy eating and physical activity behaviours. However, a review by Heslehurst et al. (2014) indicate that there is variation in healthcare professionals' opinion regarding the importance of physical activity during pregnancy and how motivated they are to intervene during this time. Additionally, variation was also noted in whether they routinely discussed physical activity and in their own knowledge of exercise recommendations, benefits and safety. It seems, therefore, that the practicing behaviours of healthcare professionals themselves need to be addressed and for midwives specifically to engage with public health agendas and adopt a health promotion philosophy in caring for expectant mothers (Biro, 2011).

## **5.5 Conclusion**

This study has shown that whilst distal past exercise behaviour (i.e. before pregnancy) is important in the maintenance of vigorous intensity physical activities, proximal exercise behaviour within the stable context of pregnancy is crucial in the maintenance of both moderate and vigorous intensity exercise behaviour. It is therefore important to embrace a life-course approach to women's health and to establish physical activity behaviours prior to pregnancy but equally to support women in maintaining these throughout pregnancy. Current evidence suggests that women are particularly receptive to behaviour change in the three months before pregnancy and when advised to do so by a health professional (Stephenson et al., 2014). Future research should investigate whether this period is sufficient to facilitate an exercise routine that can be maintained throughout pregnancy.

## **Chapter 6: Study Three**

### **6.1 Introduction**

“Teachable moments” are described as particular events, contexts, or sets of circumstances where healthy behaviours can be emphasised to encourage positive lifestyle changes (Lawson & Flocke, 2009). Pregnancy is one such life event that has on the one hand been identified as a causal factor in the decline of exercise participation among women (Gaston & Cramp, 2011) but, on the other is also viewed as a window of opportunity to address health matters such as weight management and obesity prevention strategies (Phelan, 2010). It is therefore not surprising that midwives are regarded as being “ideally placed” to advise on diet and activity changes during pregnancy (Weir et al., 2010, p. 6). Specifically, midwifery is a profession concerned with “skilled, knowledgeable and compassionate care for childbearing women, newborn infants and families across the continuum throughout pre-pregnancy, pregnancy, birth, postpartum and the early weeks of life” (Royal College of Midwives; RCM, 2016, p. 3). Indeed, Study One of this project and other research alike have identified midwives as invaluable sources of information during pregnancy (Gross & Bee, 2004; Olander, Atkinson, Edmunds & French, 2011). Current research is, however, focused predominantly on the management of pregnancy weight gain and maternal obesity (Heslehurst et al., 2014). Thus, whilst overweight and obese pregnant women now have access to specialist maternity care pathways (National Institute for Health and Care Excellence; NICE, 2010), the value of physical activity monitoring and guidance as part of the routine care that pregnant women receive, is overlooked and/or underestimated. In recognition of midwives’ central role in the dissemination of information during pregnancy, the primary purpose of the final stage of this multiphase research design is to gain insights into midwives’ perspectives of providing exercise

advice and guidance to pregnant women in the East Kent region of England. Specifically, the study aims to explore: (1) midwives perceived roles and responsibilities in providing exercise advice and guidance to pregnant women; (2) the barriers perceived by midwives in providing effective exercise advice and guidance to pregnant women; and (3) whether midwives perceive any opportunities in changing pregnant women's exercise behaviour?

## **6.2 Methods**

### **6.2.1 Recruitment procedures**

Community midwives were recruited from the same ten randomly selected NHS antenatal clinics in East Kent as the pregnant women in Study Two. This concurrent recruitment procedure served the purpose of involving the midwives that cared for the pregnant women participating in this study thereby explaining and enriching the data provided by them. Midwives were eligible for inclusion if they were at least 18 years of age, proficient in the English language, was practising as a community midwife at the time, and had been qualified for more than one year. The researcher explained the study and provided potential participants with an information sheet (see Appendix S), consent form (see Appendix T) and demographics questionnaire (see Appendix U). Those midwives who agreed to participate were then contacted by either e-mail or phone and a date, time and venue for the interviews to take place were agreed. The interviews were recorded and transcribed verbatim by the researcher. A copy of the transcript was subsequently made available to each participant providing them with the opportunity to offer further comment or clarification on the issues raised. Participation was voluntary and midwives could choose to withdraw from the study at any time. As incentive for taking part, participants were offered the choice of receiving a £10 high-street shopping

voucher or for an equivalent donation to be made on their behalf to the charity Tommy's (see Appendix D).

### **6.2.2 Data analysis**

A combination of inductive and deductive approaches was used to produce a thematic description of the data. Specifically, the semi-structured interview schedule developed for this study was informed by the data produced during Study One of the multiphase design framing the research project (see Appendix V). This served as an a priori template for the initial organisation of data, however, new themes were also allowed to emerge from the analysis. A six-staged process of thematic analysis was undertaken which involved: (1) data familiarization, (2) data coding, (3) identification of themes, (4) revision of themes, (5) defining and naming of themes, and (6) writing up (Braun & Clarke, 2006; Clarke & Braun, 2016).

### **6.2.3 Data saturation**

The concept of saturation (or the point in qualitative data collection and analysis where additional information does not yield any new codes or themes) was first introduced by Glaser and Strauss in 1967 (as cited in Francis et al., 2010). Whilst typically associated with grounded theory analysis, saturation serves as indication of an adequate sample size (Payne, 2016). When using interview data in thematic analysis, Clarke and Braun (2016) recommend a minimum sample of six participants as the focus of the analysis is on "patterned meaning across cases rather than idiographic meaning" (p. 88). Data saturation is, however, also suggested to be a function of the interview structure and content, and the homogenous nature of the sample, specifically, the more similarities and consistencies shared between participants, the sooner data saturation will be achieved (Guest, Bunce, & Johnson, 2006). In this context, it should be

noted that the midwives participating in this study represented such a sample and that data saturation occurred at the recommended minimum sample level.

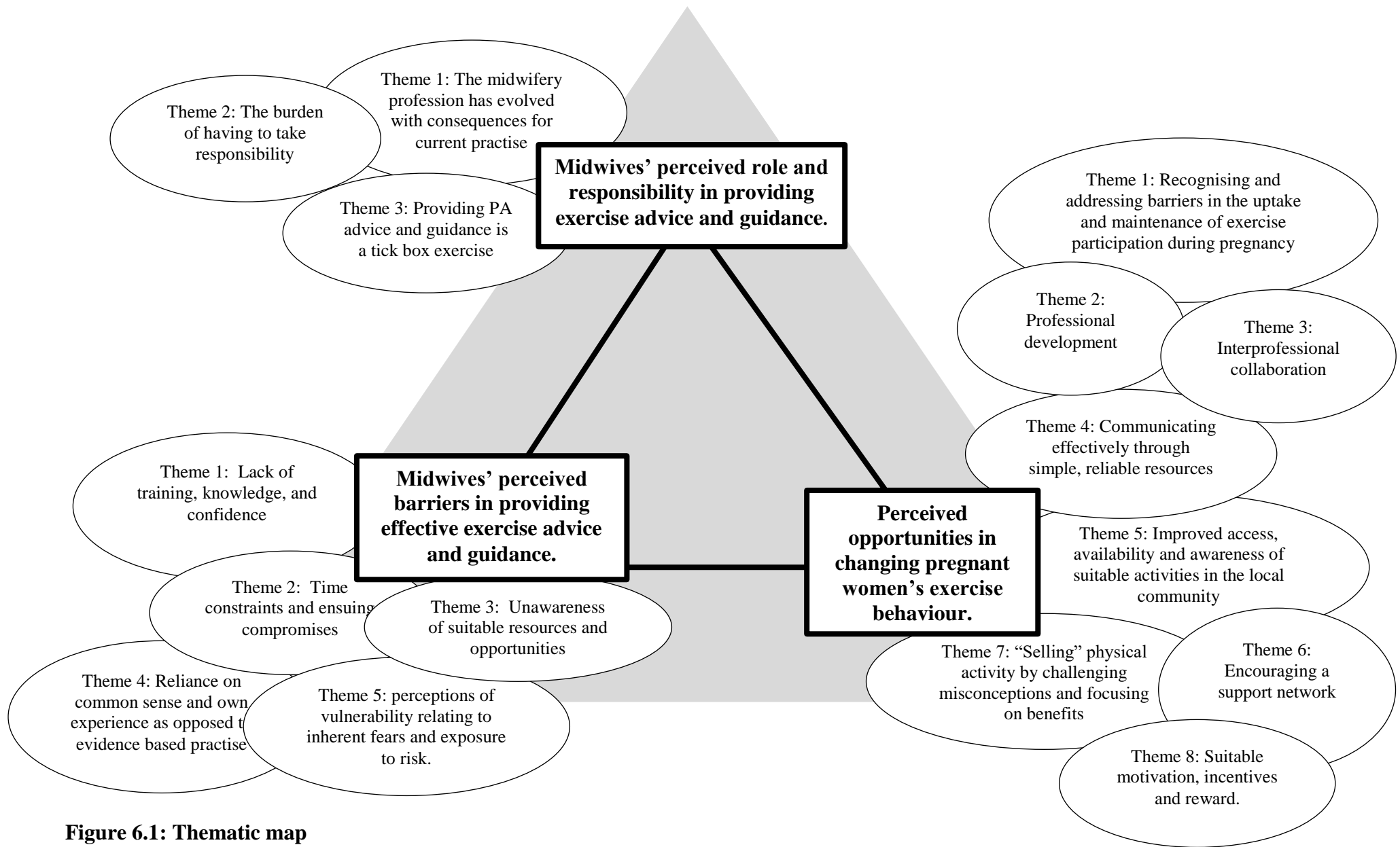
## **6.3 Results**

### **6.3.1 Sample characteristics**

Of the 19 community midwives who were approached, 10 agreed to take part in the study. All participants described themselves as being of English or British nationality with English being their first language. Participants had a mean age of 50.8 years ( $SD = 8.44$ ) with most women being married (90%) and all reported having two or more children of their own. All participants had attained a Level 5 education (i.e. diploma of higher education or foundation degree) or above and eight participants described that they held other qualifications in addition to being a midwife (e.g. registered nurse, newborn examiner, family planning nurse, perinatal mental health lead, aromatherapist, etc.). Midwifery experience ranged from 5 to 37 years ( $M = 16.50$ ,  $SD = 11.55$ ). Of the six participants who reported their employment status, four indicated that they were employed full-time. All the midwives who took part in the study elected for a £10 donation to be made on their behalf to the charity Tommy's.

### **6.3.2 Thematic analysis**

Themes were identified under three central organizing concepts: (i) midwives' perceived role and responsibility in providing exercise advice and guidance, (ii) midwives' perceived barriers in providing effective exercise advice and guidance, and (iii) perceived opportunities in changing pregnant women's exercise behaviour. Participant quotes are used to illustrate themes, however, to preserve anonymity participants were assigned with pseudonyms. The identified themes are summarized in Figure 6.1.



**Figure 6.1: Thematic map**



### **6.3.2.1 Midwives' perceived role and responsibility in providing exercise advice and guidance.**

Theme 1: The midwifery profession has evolved with consequences for current practise.

Participants reported that the profession of midwifery has changed over the years and that this impacted on their ability to deliver what they perceived as quality individualised care. Two key issues dominate this perception: (1) midwives experience increasing demands and expectations, and (2) midwifery practise has become defensive in nature.

Subtheme 1: Midwives experience increasing demands and expectations.

Participating midwives perceived being subject to increasing demands and expectations from both a professional perspective but also from pregnant women themselves. These issues result in midwives being faced with daily challenges (e.g. time, caseload, staffing, paperwork, etc.) which impact on their morale and ability to care for pregnant women.

“The main challenges are time and my case load is big. Umm, I only work four days a week but I've almost got more than a full-time case load, so it's trying to fit everything in, umm, it's difficult. The demands of the women as well recently seem to be getting more. I think people expect more from you and as soon as they're pregnant they, they turn to you first for everything, you know, even if it's unrelated to the pregnancy, they'll phone us because they all have our telephone numbers.” [Sally, 43]

“Yes, in the last five to ten years there's been more, much more forms to fill in, many more, umm, things we've got to adhere to, more things we've got to learn, uh, it's, the increase is constant and the output is maximum...” [Kate, 67]

“...I think as the midwifery profession has evolved, as well as having a lot of onus put on antenatal care, we also have like a public health agenda that’s actually crept in over a period of time...” [Emma, 62]

“So yeah, I think challenges are many at the moment and I think morale, not necessarily within our team, but generally is quite low and a lot of that I think is to do with staffing levels and workload and maybe un, unrealistic expectation. Umm, I think for me personally I feel like, umm, that gets in the way of doing the job that I thought I was training to do, which is to spend time, as much time as that individual person needs, you know, umm, whereas we’re more and more being given, higher targets, more paperwork, umm, and less time to do that in. And I think the, the thing that suffers is maybe the, the women feel that we’re rushed or that we end up trying to do all those things at our own detriment, you know, so burnout and stress within the profession I think is really high.” [Vicky, 50]

Subtheme 2: Midwifery practise has become defensive in nature.

Midwives demonstrated frustration with the fact that their practise have become increasingly complicated and governed by external influences. An extended scope of practise with increasing responsibilities and the resulting fear of potential litigation have caused midwives to become defensive in their practise.

“Umm, so you know, it was a lot simpler when I first started and, umm, our roles were quite defined, umm, so we looked after pregnant women and you know, we provided them with all aspects of their health and, umm, it seemed quite simple. And now there’s a lot more about the public health agenda, umm, a lot more about risk assessment, umm, and it feels very, umm, like you are sort of, you know, fighting an uphill battle and you are, you know, always being

very defensive of your practise and your care, so you're writing things down so that you, it doesn't come back on you." [Amy, 40]

"...autonomous practice has been eroded by tick boxes, litigation, umm, government controlling saying the women should have these rights, this should be happening, there is not enough midwives and all that and now it's gone from a role of, umm, caregiving, judgement, umm, decision making for the women to being defensive in your caregiving in case of litigation...." [Sue, 55]

"Time, time is a huge one. Umm, my case load is too big for a part-timer, but because of staffing levels, it's just the way it rolls at the moment. Umm, I feel my biggest challenge at the moment is maintaining my safety. Umm, I think there's things that I forget now, because I've got too much other stuff going on. Umm, I think my postnatal care is quite poor now because I'm so busy rushing in and rushing out, because I think well I haven't got time to be here, so I've got to adjust that a little bit more because women still need your time postnatally as well. So I find that quite challenging." [Louise, 50]

"Yeah, I think it's all about liability and getting sued, that's how I see it." [Tina, 45].

Theme 2: The burden of having to take responsibility.

In general, participants felt that midwives were ideally placed to provide exercise advice and guidance to pregnant women but that they were not equipped to provide anything other than basic advice. However, some midwives also pointed out that the onus should be on pregnant women to take responsibility for their own health and wellbeing and to have a more active role in deciding what is right for them. Midwives further expressed their frustration with the

confusion that exists between exercise and health professions regarding the responsibility of advising women during pregnancy. A few midwives also commented that pregnancy was too late to bring about change in pregnant women's lifestyle behaviours and that this should be addressed at preconception clinics.

Subtheme 1: Midwives are ideally placed to provide exercise advice and guidance.

When asked to respond to a quote from literature (see Appendix V), midwives agreed that pregnant women did not receive adequate information about physical activity during pregnancy and that the topic was not emphasised enough. However, despite feeling that they were not equipped to provide effective advice and guidance they believed they were ideally placed to do so.

“I do, I think, umm, we are ideally placed to give that information particularly at the booking appointment; we've got the time capacity to do it. But I don't think we're fully, umm, equipped with the information really. Umm, and like he said, you know, you mentioned earlier, there are women that do, you know, variable things, you know, various things and they come to us for that information and I haven't got the answer.” [Lucy, 46]

“...they've asked me and I actually just don't know, so, umm, where do you go with that really and of course it's, you know, the lady feels that you should know that...” [Lucy, 46]

“...they have a huge expectation, our women, that they think we know everything and we don't and, you know, and we do tell them. I do tell the ladies straight that I don't, if I don't know, I don't know; I'm not going to make it up. Umm, but it would be handy to, you know, to know what was acceptable and what wasn't acceptable. Umm, because it's, you know, that

in itself is a whole, you know, it's a different field. I feel like I'm the person that could deliver that information, but I don't have the knowledge, umm, or the resources to give it out properly."

[Lucy, 46]

"...we do work on, we work on the ground with these ladies, umm, we are, I think, you know, we're the perfect person to kind of, you know, give that information out." [Lucy, 46]

Subtheme 2: Pregnant women fail to take responsibility for themselves.

Some midwives were also keen to point out that pregnant women have to take responsibility for their own health and well-being and that the expectation for midwives to know everything was unrealistic.

"Sometimes it's the women's perception, because they've got to take responsibility themselves at some point, but they seem to think the midwife will do it all. The midwife to do all their appointments, the midwife will get this, the midwife will do that, and it's, it's difficult for them to understand that we can signpost, we can give information or we can say yes or no, which is best, but it's up to them to actually go to the stop smoking course, go to the, umm, Children's Centres and learn about diet and things like that, and a lot of them what might be a five minute chat when I think I'm giving information about how good the benefits is to walk or swim, they might not, may not even perceive that as anything to do with exercise. [Sue, 55]

"...I do think we are in the, you know, we are in the right place to be able to advise people but I think that's all it is, we can give the advice and I think the responsibility actually lies with the women themselves to actually want to do it." [Sally, 43]

“Well it’s difficult because we kind of, you know, we, we encourage women to, umm, have a, a role in, you know, assessing what’s right for them. So we don’t like to be prescriptive...” [Vicky, 50]

“Yeah it’s amazing the power and the umm, the umm, you know, the place that they put you. Some, I mean some put you absolutely up there with the gods, don’t they? And umm, and then others, just well, have complete contempt for you. But uh, you know, but most do think that you are the fount of all knowledge and obviously we’re not...” [Lucy, 46]

Subtheme 3: Passing the buck between exercise and health professionals.

Midwives shared their experiences and frustrations of the buck being passed between exercise and health professionals. This reluctance of professionals to accept responsibility, however, appears to affect pregnant women who are regular exercisers in particular, often leaving them without clear guidance.

“Because if you, if you say to them, umm, go and ask whoever is teaching you, they, they would say ask your midwife, so that’s a real area that we struggle with.” [Louise, 50]

“... I wouldn’t really advise them personally on anything, because I don’t know what is available and a lot of the, the women have come back and said, my gym instructor said ask the midwife, where I might have said to them you need to tell him you’re pregnant and they will tailor what’s suitable for you. But they don’t, they refer them back to us, so for me that’s quite a challenge on what is available out there for them when they’re pregnant.” [Tina, 45]

“She named a class that she does and is it still safe to do when you’re pregnant, and you know, I, I really didn’t know and I just, I advised her to, to discuss it with the person who runs the class and maybe look online for some information, umm, I, you know, stay well hydrated and you know, look out for your own signs in your body that it’s too much.” [Amy, 40]

“...no just general questions and some people like do classes or things and that’s where I say well speak to your instructor because they must have knowledge and I’d said, you know, as far as I’m aware, you can continue it but just tone it down a bit and they’ll advise you.” [Anne, 50]

#### Subtheme 4: Lifestyle change should start with preconception clinics

A few midwives voiced the opinion that they felt pregnancy was too late to bring about change in pregnant women’s lifestyle behaviours. They suggested that health issues should be addressed prior to pregnancy in preconception clinics with the aim of assisting women in achieving optimum health before becoming pregnant.

“I, I think there should be preconception clinics, ideally, and that’s where you start the lifestyle change prior to the pregnancy, you know, and umm, talk to women about exercise then. And I think women who are wanting to conceive are going to do everything to make themselves healthy cause they want the baby. And I know you’ve got women who don’t plan pregnancies, you know, but I think if you could have, you know, ‘Well Women’ clinics up and running, you know.” [Anne, 50]

“... by the time we see a pregnant woman, you know, she is where she’s at and then it is difficult then to actually change them.” [Emma, 62]

“Yes, well I must tell you, when I was doing my training it was always the well people and, uh, you know, physically able people and healthy ones, who were pregnant.” “But now we have who have assisted conception, people who 20 years ago would not have been able to conceive, are now pregnant so it brings its own problems. So when people say that caesarean section rates have gone up, so that has something to do with that because of the, you know, the quality of the women we’re looking at.” [Emma, 62]

“We were going to have ‘Well Women’s’ clinics and we were going to invite women thinking about conception to make sure they are in optimum health before they conceive...” [Emma, 62]

Theme 3: Providing physical activity advice and guidance is a tick box exercise.

Participating midwives reported that the physical activity advice and guidance provided to pregnant women is limited to a tick box exercise at the initial booking appointment. Typical advice is basic but in line with RCOG (2006a) guidelines, that is, pregnant women can continue with activities that their body is used to. Three scenarios are evident in relation to this theme: (1) physical activity is addressed at the booking appointment but not revisited again unless asked about, (2) only pregnant women who are regular exercisers will enquire about physical activity, and (3) the emphasis on physical activity is inconsistent with midwives pushing different agendas.



Subtheme 1: Physical activity is only addressed at the booking appointment and not revisited again unless asked about.

Midwives described the typical process by which pregnant women receive physical activity advice and guidance as a tick box exercise at the booking appointment and further revealed that the topic was not explored or revisited thereafter unless it is brought up by the pregnant women themselves.

“...we work into a tick box society and our booking has, interview has now become about two hours long. So some midwives split it into two because you can see after 10 minutes the glazed look in their eyes and there’s other issues that are potentially, will be more important than exercise, umm, that we need to get over to the women. So quite often, although the exercise bit is on the, umm, booking pack so it is mentioned, I’m guessing in varying degrees...” [Sue, 55]

“To be fair, I’m sure my colleagues will say the same thing, we asked them about exercise and we have a little tick box which we do during the booking, umm, the initial booking, umm, appointments, however, we don’t kind of explore that any further.” [Lucy, 46]

“You, you could give it time in a booking interview. You could, because it’s there, it’s, it’s a tick box, so it is something that umm, we mention, but we don’t elaborate.” [Louise, 50].

“Umm, at booking it’s something that we briefly touch on cause of everything else that goes on.” [Louise, 50]

“But also, you know, are you saying that each time we see them in clinic we discuss exercise with them and encouraging them and that, and that is another, it’s a time thing cause I find I will discuss it at the beginning of the pregnancy at booking and give lots of advice out, umm, but I probably wouldn’t revisit it.” [Anne, 50]

“I touch very briefly on it at booking and then when I get them back in here a week or two weeks later for their bloods, I go over things again in more detail, cause it’s too much. I tend to do the important, the really important things at the main booking and then go over and do the exercise on the next one as well. Umm, in the scheme of things, I think they should do some form of exercise.” [Tina, 45]

“... but we do enquire when we book them what sort of exercise do you do, you know, on a daily basis do you swim, do you walk or, you know, do you run.” [Emma, 62].

“I think, I think the exercise part is at the booking interview you mention that and then it’s really not visited again unless, but again it’s practitioners, they’re all different as to what you would do.” [Emma, 62]

“You tick the box. But if you’re, if you take on the wider concept of what is, what constitutes health and all its bits, you know, for example smoking, uh, stop smoking, we’re quite big on stop smoking, umm, we’re quite, obesity is another one, but then again by the time they come to us it’s tricky.” [Emma, 62].

Subtheme 2: Only pregnant women who are regular exercisers will enquire about physical activity.

Participating midwives recognise that it is typically pregnant women who are regular exercisers at the time of becoming pregnant that will make enquiries as to whether they can continue whereas those who do not exercise regularly will often make excuses for not doing so and the issue is then not explored any further.

“What, what tends to happen is women that umm, are good at exercise will ask you if it’s ok to carry on whilst they’re pregnant. The women that don’t exercise, you say to them ‘do you do any moderate exercise’ and they say ‘oh no I can’t cause I’m too sick, I’m too tired, la la la’.” [Louise, 50]

“...because often either two ways, they’re either somebody that does exercise already and they want to know what they can carry on doing and what are safe for pregnant women, or they’re unfit or you know don’t do any exercise and you know we, we mention it. It doesn’t get a huge slot, timeslot, but we do talk, it gets talked about.” [Amy, 40]

“But I don’t think a pregnant woman is going to start exercising because she is pregnant necessarily. I think it is more women who already exercises, you know, who will continue and those are the ones who are seeking the advice.” [Anne, 50]

“... unless they come to me, umm, and say, you know, do you know about this, do you know about that, I just ask them, you know, uh, every day they come in to see me I ask them how they are, ask them if they’re eating well, do they, what have they done, how, you know, are you walking, keeping, but I don’t actually ask about exercise directly, no.” [Lucy, 46]

“... it’s the same old attitude, women who are motivated will come, they will just, uh, seek the advice, they will seek the help and they will go out of their way to get it.” [Emma, 62]

“But, but it is those who are keen, you know, come in and then you talk about, to them about exercises together so, and that tends to work quite well.” [Emma, 62]

“I would, I would say to a woman, you know, the women that are fit before they’re pregnant are the, you know, the ones that goes to the gym or do the exercise classes, or they go swimming or running, you know, they’re the ones that are normally asking you questions and my general advice is, if you were doing it before you were pregnant continue doing it but listen to your body, if you feel that you’re gonna injure yourself, then don’t do it. And obviously if there is any bleeding or any complications to pregnancy then don’t do it but otherwise continue doing what you were before you were pregnant.” [Sally, 43]

Subtheme 3: Emphasis on physical activity is inconsistent with midwives pushing different agendas.

The emphasis that is put on physical activity varies as it appears that midwives are pushing different agendas depending on their area of interest or speciality. Further, due to the amount of information that needs to be discussed and the time available, midwives report having to prioritise what they consider as relevant and important to each pregnant woman.

“Umm, so I think it’s more on, I don’t know if it is from area or individual midwives, but there is overall a lack and when I talk to the girls in the unit about, umm, their bookings, umm, I think everyone seems to focus on a different area. Umm, my work before was screening so I do screening, but no one seems to focus really on exercise.” [Sue, 55]

“...and there’s other issues that are potentially, will be more important than exercise, umm, that we need to get over to the women. So quite often, although the exercise bit is on the, umm, booking pack so it is mentioned, I’m guessing in varying degrees...” [Sue, 55]

“It’s quite low, umm, there are other things that are more, need to be addressed there and then...” [Sue, 55]

“Umm, but I do, I’ve, when you take on other women when midwives leave, it’s how different midwives practice to how much information those women are given. But I don’t think we’re trained enough in the exercise.” [Tina, 45]

“No. Do you know what, now, since meeting you and, you know, and umm, and speaking to the girls after they’ve spoken to you actually (laughing), I realised that we don’t, umm, we don’t put enough emphasis on exercise during pregnancy, well I, I know, myself, I don’t.” [Lucy, 46]

“...we did talk about exercise and the importance of exercise through, umm, pregnancy, umm, but, you know, it was, it was probably very short and very, not in depth enough to be able, for us to be able to kind of give any kind of professional advice on.” [Lucy, 46]

“I think we do give advice on dietary matters but on exercise I don’t think we give any really, yeah.” [Sally, 43]

“Umm, so it’s a, it’s a tricky one on how midwives perceive their role and how much time you have in the clinic, like you’ve said earlier, how much time are you allocated, 20

minutes to do a follow-up appointment and in that time you've got to decide which, what's important and also what's relevant to the woman at the time." [Emma, 62]

"...but it's a time constraint as to what's, you know, you got to prioritise and it doesn't come top of the priority list so, so therefore it gets left behind." [Emma, 62]

"But I think that probably it isn't quite enough and I think also that if, you know, if you're, if you're talking to someone that's never really done exercise and never really seen maybe the benefits, then you're not gonna change that by just giving them that little bit of information but, so maybe some kind of specialist, you know, service would be good. Especially maybe for those women that were, umm, larger ladies who have been told of the increased risks, I think it's maybe really hard then for them to actually motivate themselves to start exercising especially if they're pregnant, so yeah, I don't think there's enough." [Vicky, 50].

### **6.3.2.2 Midwives' perceived barriers in providing effective exercise advice and guidance**

Midwives identified several perceived barriers in providing effective exercise advice and guidance to women during their pregnancy. These barriers are exemplified under five themes: (1) lack of training, knowledge, and confidence; (2) time constraints and ensuing compromises; (3) unawareness of suitable resources and opportunities; (4) reliance on common sense and own experience as opposed to evidence-based practise; and (5) perceptions of vulnerability relating to inherent fears and exposure to risk.

Theme 1: Lack of training, knowledge and confidence.

Lack of training, knowledge, and confidence was cited throughout as a reason for not being able to provide effective exercise guidance and advice. Midwives were unsure if the curriculum had changed to include the topic within the public health module of current student midwives' training but reported that it was not included as part of the training they had received. Participating midwives also appeared to have difficulty in providing advice regarding specific activities, e.g. Zumba, horse riding, etc. The general lack of knowledge in this area also resulted in a lack of confidence meaning that only basic advice could be provided to pregnant women.

“I’ve never had any training. No. Not in that specific area.” [Sue, 55]

“I think it’s something that we’re not taught, it’s not something that’s on our criteria if you like. So whether it’s something that the girls coming through are taught now more in the public health sector side of our training I don’t know, but us old birds definitely weren’t taught about it.” [Lousie, 50]

“Umm, you know I’m, I’m not a fit person, I don’t know much about exercise so my knowledge is limited and we get asked the questions you know, is it safe to do Zumba when you’re pregnant and I can’t, you know, I just think about the elements of Zumba and they explain to me about the different classes that they do and then I try and answer it that way, but I have to say my knowledge is limited. [Amy, 40]

“Yeah, although I mean my training was a long time ago. Umm, I don’t know if they currently get any training, if they get any, you know in the health, in their public health, umm,

bit of the midwives training, I don't know if they, yeah I don't know if they have any exercise, umm, discussion, I don't know." [Amy, 40]

"No, you just look on the internet and update yourself as and when or I tend to do it if somebody asks me a specific question, I'll go and I'll have a look at research, umm, for that or I try and ask if I can. A lot of people are saying but they don't know. But there is nothing out there really." [Tina, 45]

"I, I'm not that confident actually. As I said earlier, I just say the very basic stuff; you can continue." [Anne, 50]

"...but I don't, I don't have that, I don't know if I'm honest. Umm, that would be me just thinking outside the box and thinking I actually, I don't probably think that's a good idea (laughing)." [Lucy, 46]

"Absolutely, it's just not having that information and, you know, potentially having to ask her to go somewhere else to get it. You know, she looks upon you as the fount of all knowledge and actually you, but that's the thing about midwifery as well though; we don't, we don't, umm, we don't claim to know everything in which case then we refer to somebody else. But actually with regard to your, you know, the exercise, it would be handy to have something in place to say well it is ok to do Zumba, it is ok to do your horse riding and we quite often have somebody who says they horse ride." [Lucy, 46]

"Probably, because we don't have any training. I don't, I don't remember ever being part of the midwifery, uh, training syllabus." [Vicky, 50]



Theme 2: Time constraints and ensuing compromises.

Midwives identify time constraints as one of the most prevalent barriers in providing effective exercise advice and guidance. Typically, exercise advice is basic and not revisited again as information and tasks are often prioritised in terms of relevance and importance. In addition, having to manage time and extended caseloads means that midwives feel exposed to greater risk.

“Time, time to get everything done, umm, particularly the paperwork that comes at the end of the list of jobs to do and although it is very important, you know, you want to see your women and organise them and sort them all out, but then, yeah to try and catch up on the paperwork at the end of the day.” [Anne, 50]

“But also, you know, are you saying that each time we see them in clinic we discuss exercise with them and encouraging them and that, and that is another, it’s a time thing cause I find I will discuss it at the beginning of the pregnancy at booking and give lots of advice out, umm, but I probably wouldn’t revisit it.” [Anne, 50]

“Time and even for us as the midwife to remember to, to revisit about exercise you know they’ve probably gone out the door and you think ‘ah I didn’t mention that’, you know.” [Anne, 50]

“Time, time is a huge one. Umm, my case load is too big for a part-timer, but because of staffing levels, it’s just the way it rolls at the moment. Umm, I feel my biggest challenge at the moment is maintaining my safety. Umm, I think there’s things that I forget now, because I’ve got too much other stuff going on.” [Louise, 50]

“I touch very briefly on it at booking and then when I get them back in here a week or two weeks later for their bloods, I go over things again in more detail, cause it’s too much. I tend to do the important, the really important things at the main booking and then go over and do the exercise on the next one as well. Umm, in the scheme of things, I think they should do some form of exercise.” [Tina, 45]

“...we did talk about exercise and the importance of exercise through, umm, pregnancy, umm, but, you know, it was, it was probably very short and very, not in depth enough to be able, for us to be able to kind of give any kind of professional advice on.” [Lucy, 46]

“Umm, so it’s a, it’s a tricky one on how midwives perceive their role and how much time you have in the clinic, like you’ve said earlier, how much time are you allocated, 20 minutes to do a follow-up appointment and in that time you’ve got to decide which, what’s important and also what’s relevant to the woman at the time.” [Emma, 62].

“...but it’s a time constraint as to what’s, you know, you got to prioritise and it doesn’t come top of the priority list so, so therefore it gets left behind.” [Emma, 62].

Theme 3: Unawareness of suitable resources and opportunities.

In general, midwives were unaware of suitable resources (leaflets, websites, books, etc.) to either draw on themselves or recommend to pregnant women. In most cases, pregnant women were directed to the NHS Choices website although midwives were not familiar with the content themselves. Additionally, midwives also showed a lack of awareness of suitable exercise opportunities in the local community.

“...I can’t think of any Trust or NHS leaflets specifically about exercise where there is on diet, there is on drinking, there’s on smoking, but I can’t think, except the postnatal exercises they go home with that no one ever reads.” [Sue, 55]

“I don’t actually know any websites.” [Sue, 55]

“No, I haven’t, no I haven’t, I haven’t got any resources for exercise in pregnancy.” [Louise, 50]

“We direct everybody to the NHS website because there is often a lot on there that we haven’t even seen, but because it’s specific to them they will go and look for it.” [Louise, 50]

“That’s the one that I use a lot, is the NHS Choices, because that is quite good, it gives quite a broad overview of, umm, most things really.” [Sally, 43]

No, cause I don't really, oh well NHS Choices, but I don't, to be fair I don't think I have looked at the exercise recommendations on there but I would imagine it's fairly limited but I don't know that. [Vicky, 50]

“We direct them to the NHS Choices website and that’s my favourite one...I mean you know what it is like yourself when you just google anything, you just get everything don’t you and it’s probably quite overwhelming for them.” [Amy, 40]

...a few years ago they used to do I think like pram walks and umm, you know, sort of, you know get mums with toddlers in prams and buggies or in strollers or you know mums, new

mums with prams and organise you know walks on the sea front and you know things like that but you don't, I don't hear much about them anymore. Umm and aqua natal as well, you know classes for pregnant mums, but you don't sort of hear much about that anymore either. [Amy, 40]

“We occasionally have yoga flyers but to be honest with you again I, you know, I've never, never sort of been to any of those groups myself so, umm, we would always, if we've got them then we'll give them out, but I would always sort of say make sure that people check out the credentials of somebody offering those services, umm, but no, I think that's about it, yoga. I don't know any other.” [Vicky, 50]

Theme 4: Reliance on common sense and own experience as opposed to evidence-based practise.

A lack of training, knowledge and resources regarding exercise have resulted in midwives having to rely on common sense and their own experience to advise and guide pregnant women. However, midwives express the desire to be able to provide reliable and current information as part of evidence-based practise.

“I do agree that we're not equipped enough to formally give information about exercise, but a lot of it is common sense.” [Sue, 55]

“No, it's, it's just what you've picked up along the way. It's, it's more experience than training, but like I've said I don't know what the girls are taught now regarding exercise...” [Louise, 50]

“But, umm, you, you tend to just pick it up as you go along, and, like somebody will say something ‘have you read so and so’ and you think ‘no’, so I’ll go and read it, so it tends to be that sort of thing. It’s not something that’s, umm, on our mandatory updates, it’s not something that’s spoken about.” [Lousie, 50].

“I do feel there is limited information, you know, and I don't have lots of knowledge about what advice to give women, I just draw on, like my personal experience and sort of what I’ve picked up going along, you know.” [Anne, 50]

“Yeah, just using my, you know, my, my knowledge of the human body and what would be, you know, what I think would be acceptable during pregnancy basically.” [Lucy, 46]

“Yeah, yeah, yeah, like, you know I want to be able to know that the information I’m giving is correct and current, and you know and simple things that people can do.” [Amy, 40]

“Oh it, it would be brilliant to have something like that, some sort of, you know, that we could say this is research based and this is what you can do or we advise you, you know, yes.” [Anne, 50].

“No, I think maybe the only other thing is that maybe some kind of online, umm, facility for women, or an app. I mean I know there are loads of apps out there, umm, but we don't have any real way of, you know, checking whether they’re credible or not, so maybe some kind of NHS approved app that could motivate women in pregnancy specifically.” [Vicky, 50]

“But again, we just have to keep trying and like you’ve said if the evidence is out there so then maybe we need to take it on board a bit more, increase our awareness and thereby then sell it to the women and say, well you know, this is the situation, you know, so how about you?” [Emma, 62]

Theme 5: Perceptions of vulnerability relating to inherent fears and exposure to risk.

Midwives is under increasing pressure to take on more responsibilities, however, due to time constraints, lower staffing levels, and increasing caseloads there is also the added pressure of having to manage risk in terms of safety and liability. When it comes to advising pregnant women, midwives also fear not giving the right information, disappointing, upsetting, or potentially offending pregnant women.

“Umm, I feel my biggest challenge at the moment is maintaining my safety. Umm, I think there’s things that I forget now, because I’ve got too much other stuff going on.” [Louise, 50]

“Yeah, I think it’s all about liability and getting sued, that’s how I see it.” [Tina, 45]

“Uh, no, I think probably most health professionals know that it’s, you know, it’s the right thing to do, umm, but I think the fear, it’s the fear attached to it, of not making sure that you’re giving the right information and umm, you know, you know, not sort of upsetting the women or you know offending the women or, you know.” [Amy, 40]

“Yeah, I think it’s difficult especially when you’re a midwife that is overweight herself. Although I do exercise regularly, I do go to boot camp twice a week and, you know, I do

actually exercise regularly, umm, but I think the women, they, you know, people look at you and take you on face value of what they see and I think there would be some women that would probably take umbrage to, umm, somebody saying to them, well I think you need to exercise regularly and you need to watch what you eat, if the person sitting in front of them (snigger) is big themselves or, you know, doesn't look as though they exercise or eat healthily themselves.”  
[Sally, 43]

### **6.3.2.3 Midwives' perceived opportunities in changing pregnant women's exercise behaviour.**

Based on their own experiences of working with pregnant women in the local community, midwives identified feasible opportunities in changing pregnant women's exercise behaviour. These suggestions are illustrated through eight themes: (1) recognising and addressing barriers in the uptake and maintenance of exercise participation during pregnancy, (2) professional development, (3) interprofessional collaboration, (4) communicating effectively through simple, reliable resources, (5) improved access, availability and awareness of suitable activities in the local community, (6) encouraging a support network, (7) “selling” physical activity by challenging misconceptions and focusing on benefits, and (8) suitable motivation, incentives and reward.

Theme 1: Recognising and addressing barriers in the uptake and maintenance of exercise participation during pregnancy.

Participating midwives recognised potential barriers (e.g. time, childcare, finances, work commitments, etc.) that could prevent pregnant women from engaging in physical activities during pregnancy. They then also made suggestions as to how these barriers could be

addressed in order to limit excuses for not attending and improving the uptake and maintenance of exercise activities. For example, activities should be free at the point of access and a crèche should be provided.

“...and we do have aqua natal for pregnant women, but again lots of ladies can’t get there cause they’re working.” [Sue, 55]

“Umm, the other thing is, umm, yoga. Now in, in [town] there, there is a yoga group and they do specific for pregnant women, mums and babies, which is wonderful until you say it’s private and that they have to pay. That’s the other thing, the ladies expect not to pay for things. [Sue, 55]

“Umm, and it has to say, be free. Some areas, depending on how affluent the areas are, they’re quite happy to pay for things, which is fine, but I know in this area they won’t be able to pay for something like this.” [Sue, 55]

“You need to have a crèche if they’ve already got toddlers and things like that and I think that could be free, you know, so in a way they’ve got no excuse not to go, you know.” [Anne, 50]

“Uh, because to be fair, that’s what, you know, most of the population, most of the ladies I look after, you know, they’ve had more than one child and their just, you know, their days’ tied up looking after a family.” [Lucy, 46]



“Yeah, time wise, you know, getting involved in things, umm, and probably just don't have the time to look after themselves, rather than those new moms that maybe were a little bit more keen.” [Lucy, 46]

“Some would, a lot of the, you know, particularly those ladies, umm, you know, having their first baby, slightly older, umm, very keen to do the, you know, the right thing, they would definitely take, you know, uh, you know, I can almost imagine them taking that up, but the busy mum, she's not going to (giggle).” [Lucy, 46]

“...so I cannot see why the Department of Health won't sanction free exercise classes for, you know, pregnant women.” [Emma, 62]

“Uh, you know, to motivate people to be well and to be healthy and do the right thing, umm, it is, it is difficult. And also, some women do find it very hard because they're, they are holding down a full-time job. They've either, it's either that and then by the time they come home they're absolutely shattered and they can't really do anything...” [Emma, 62]

“Umm, and it's very difficult to know whether it should be free. I think a crèche is always gonna be handy because you would get more women that would use it.” [Sally, 43]

“There isn't much and it would be nice because I'm sure, umm, for mums that aren't at work, working mums might find it a bit difficult, umm, but for mums that aren't at work they would go to, I know you're sure that they would if there were facilities with a crèche and things would, it would be nice to have more going on definitely.” [Sally, 43]

“The only exercise, there’s only a small amount of women who would take up anything remotely official, exercise like swimming or yoga or gym and that’s the ladies who have good jobs or husbands with good jobs, they only have one child at home, perhaps two maximum, those who can afford the time and the money.” [Kate, 67]

“Yeah, because probably the people that you’re targeting often are gonna be on low incomes and if it’s not free, to be fair, it is only going to be available to those people that can afford it.” [Vicky, 50]

## Theme 2: Professional development

Having identified lack of knowledge and training as a potential barrier in providing effective exercise advice and guidance, midwives suggested that training could be facilitated through one of their mandatory study days or as an optional online Continuous Professional Development (CPD) activity. Some midwives also suggested that exercise advice and guidance should be incorporated as part of the initial training that student midwives receive. A final suggestion included assigning exercise to a midwife (i.e. specialist lead midwife) who could lead on the topic and update other community midwives with resources and current evidence.

“You could do it as students, yes involve it into the uni, but as a qualified midwife we have two mandatory days a year. One of them we have smoking updates, about smoking, we have mental health updates, maybe that should be in as a separate topic for us as midwives to be promoted, or even maybe not on the generalised one but the community update, cause the community midwives are the ones that get up from the beginning. So maybe on that study day

they should be involving, explaining us and finding out and giving us that information on what is out there and how we can promote that.” [Tina, 45]

“I mean things are updated there but to be fair most of our, umm, most of our updating comes via a study day. We have several of those, we have community updates, umm, study days, so community midwives would just, only community midwives would attend that one. Umm, it will be perfectly placed there, I can’t see, you know, that would be a huge benefit I think.” [Lucy, 46]

“So you need, for example we have midwifery training days, we have two of them every year, so it might be on one of those training days to have people who, with an interest in promoting health through exercise to actually come to those sessions and say, well look at what we’re doing, these are our figures and these, this is what we’re about so, and then, I don’t know, they need, I feel they need to actually sell themselves and make their presence felt...” [Emma, 62]

“... we need, you know, uh, midwives with specialised, specialist leads to then, you know, make recommendations, be a resource and, uh, to then educate the others and share information, that sort of thing. So I think it would be good to have one person who leads on the exercise, I really do.” [Emma, 62]

“I mean we, you know, we’re inundated obviously with online mandatory training, but I think, umm, that if it was optional, if it was something that you could access if you wanted to then that would probably be, I think, I think probably more midwives would access it willingly, umm, sort of like the mental health.” [Vicky, 50]

“Umm, and I think that’s probably the key, you know, if you’ve got a student and you, you’re doing a booking and you’re talking about exercise, to then be able to say to them, have a look at that, then maybe that’s then gonna be part of their practise from the beginning, umm, whereas we’re not maybe used to doing that.” [Vicky, 50]

### Theme 3: Interprofessional collaboration

Midwives had differing views regarding an exercise referral service for pregnant women. Some suggested that midwives could do the initial consultation and then refer it on to a separate service, which could involve specialist midwives or health trainers. Other midwives were more sceptical about uptake and suggested that a collaborative service provided during clinic sessions would be more successful.

“I think, umm, midwives can do the initial umm, talk, because it isn’t rocket science, everyone can give a little talk on the importance of, uh, exercise and as you said incorporate it with, it’s walking, or perhaps taking the children swimming, playing in the park, that sort of thing. But it would be nice to have something then we can say, if you like to know more about this, this is where you go to or if you’re happy, like with smoking, it’s filling out a form and send it off and then someone will contact them.” [Sue, 55]

“Umm, yeah I think maybe, yeah it would be, I mean a collaborative would be good rather than a sort of, a separate service, somebody that was running alongside, umm, you know for example, like our, you know, our clinics in the community, somebody was sitting outside talking to them about exercise while they were sitting and waiting for their midwife, or catching them, you know. I think that would work really well, but I don’t know if a referral system, it’s

like the stop smoking referral system, you know it's not actually taken up very much." [Amy, 40]

"Yeah, I think a bit like, I don't mean to put you in a category alongside smoking but, umm, you're a bit, I think that would be very much a case of like, people would give it some lip service and possibly, you know, you'd end up with lots of referrals but nobody would come back to you." [Lucy, 46]

"So I think the people who are doing them or have got that expertise or leading in the field should then attach themselves to the midwifery or make them, their presence felt I feel, as well." [Emma, 62]

"It isn't and I would be perfectly frank, we have so much on our plate with smoking issues and obesity issues, you know, where we can say, look, you know, let me get you in to see a dietician, let me get, let me get you in to see the consultant who may add more weight to the argument. Umm, if there were a website or a physical, umm, an exercise trainer, who could advise, have an interview with, who could then provide more information. That would be ideal." [Kate, 67]

"There isn't enough time in the day really for smoking, obesity, drug and alcohol, all these people, all these issues have a third party for me to go to. The stop smoking team, patches and everything, obesity, the dieticians and they, they will also handle exercise, umm, drug and alcohol misuse, there's a specialist nurse as well as their consultants and all the rest of it, but with exercise there isn't." [Kate, 67]

“I do feel that exercise ought to have its own referral, umm, where the women can go for an interview, even two or three women at a time...” “Everything, as I’ve told you, smoking, drinking, everything has their own party that they can go to for individual advice, for leaflets, for, but not exercise and that, that isn’t good.” [Kate, 67]

“That’s where, for all the complaints that they’ve got – smoking, drinking – there’s nothing for exercise. And it doesn’t have to be huge, it can be once a fortnight, once a month, a half dozen or a dozen clinic spaces for a trainer, who could be a mobile trainer and just say, look exercise is not all about leotards and yoga mats, this is what you can do, you can fit in to your lifestyle, that’s my opinion but nobody listens to me.” [Kate, 67]

#### Theme 4: Communicating effectively through simple, credible resources

Having identified that they were unaware of suitable resources to either draw on or provide to pregnant women, midwives suggested the need for simple and reliable resources (e.g. bullet style leaflets) and campaigns to be developed. Furthermore, it was also suggested that an app or online facility that was endorsed by the NHS could be useful as a motivational tool.

“Umm, so that’s one thing, the other thing is again the massive load of information, information overload and I think they may just shut off after a while...” [Sue, 55]

“I think, umm, the program, is it Healthy Start program with the plasticine people? Perhaps you can have a pregnant plasticine person and a bit on pregnancy cause basic things like that, they work.” [Sue, 55]

“To sell things to midwives, we’re simple, if it doesn’t increase our workload and you give us small, simple things to be able to sell to people, we’d do it (laughing). Simple souls.”  
[Amy, 40]

“Yes, I do feel, umm, in idiot’s language, in a leaflet and I will draw attention to it; you don’t have to have a yoga mat to do this, that’s how I’ve encouraged them to firm up their buttocks and do pelvic floors. I said, you’re walking around [supermarket] anyway, so give it the business.” [Kate, 67]

“Yes, I do think, I think, as I’ve said earlier, if you could do something almost in a bullet point fashion leaflet, cause if it involves too much info, they’ll switch off, they just will not, but if in my own limited way, I talk to them about walking, it’s the only thing I know that they can and would do, especially if they had a buggy in front of them, I will go out, I will! Umm, anything else I’m not equipped to advise them on, but if it’s good for them, I will advise them hand in glove with a leaflet that is simplistic, that’s the key, it must be simplistic.” [Kate, 67]

“If you can get to them in language they understand and appreciate, you’re halfway there and that’s where I think, especially in this day and age, because they are all aware but they could no more afford even one visit to the gym, you know?” [Kate, 67]

“No, I think maybe the only other thing is that maybe some kind of online, umm, facility for women, or an app. I mean I know there are loads of apps out there, umm, but we don’t have any real way of, you know, checking whether they’re credible or not, so maybe some kind of NHS approved app that could motivate women in pregnancy specifically.” [Vicky, 50]

Theme 5: Improved access, availability and awareness of suitable activities in the local community.

Having identified that they were unaware of the activities available, midwives suggested that Children's Centres are ideally located within the local community to facilitate activities for pregnant women. They were also keen to support services hosted by appropriately trained professionals or where midwives received additional training to host activity sessions themselves. Furthermore, midwives also suggested that exercise advice and guidance should be specific to a pregnant women's environment and that this could include everyday activities such as walking and taking care of a family.

“I think Children's Centres, actually. They'll be really keen to, to focus on anything, cause it's for the whole family, so they, the only other things they do for pregnancy and pregnancy-related, are the breastfeeding support groups which are well, umm, covered.” [Sue, 55]

“I think if it's based at the Children's Centre where basically most of the ladies live within walking distance and there is some sort of, umm, purpose which they will feel and they get you know the, the food vouchers or the child care vouchers that would be quite good.” [Sue, 55]

“...I always promote the walking because I know that it's quite a safe ground to go on. Umm, on our booking thing it also says about aqua, umm, and uh, the trouble is there isn't any pregnancy classes locally. So although it's on there and we suggest it, I just suggest swimming because they can't do the aqua, as such.” [Louise, 50]



“It would be good, it would be really nice actually if, you know, especially places like Children’s Centres could put on an exercise facility for pregnant women and some of the midwives could be trained to deliver that.” [Sally, 43]

“So it would be good to have the resources of, you know, people that are trained to do maybe the yoga or say [company], that’s quite a way away somewhere, is it [town] or [town]? [Sally, 43]

“So I recognise that what little they do is focused around shopping or with the buggy and nursery, school run.” [Kate, 67]

“I give the advice according to their, their environment.” [Kate, 67]

“Yeah, yeah, I think it would be beneficial for women to be able to access something where there was somebody trained in what’s appropriate for pregnancy.” [Vicky, 50]

“So if the pregnant women were instructed by a trainer that is, umm, maybe even dual qualified as a midwife and an exercise teacher would be, would be the, the best thing because then if there were any problems then, you know, maybe you’ve got somebody there.” [Sally, 43]

“You know somebody says to me I walk everywhere, to me that’s fantastic, I say right that’s, you know. And quite often just running around looking after a family, umm, for, for a lot of women is the, is the only exercise they’re going to get. And that again to me is, umm, you know, is, is, is good.” [Lucy, 46]

“...people immediately think you expect them to be dedicating certain time in the day for them to exercise, they don't even consider walking the dog, you know, or walking to the station to catch their train as exercise. So I think it's the whole concept of some women sort of not realising that is physical activity...” [Emma, 62]

#### Theme 6: Encouraging a support network

Midwives were keen to point out and support the potential social benefit of group activities which could then also act as a support network throughout and following pregnancy. They also recognised that engaging the pregnant women's partner could be beneficial in terms of the support and motivation they can provide.

“...I think if, if they can have like a small group, cause I can't envisage it to be large groups, quite small groups, and it also acts as a way of, umm, getting together to talk about things that might, to do with pregnancy or not to do with pregnancy and being social as well. I think that would help a lot. Umm, doing what they do and then perhaps having a chat and a cup of tea. I think they'd quite like, the ladies I know, would quite like that sort of thing.” [Sue, 55]

“Umm, and I think you also need to involve the dads, if you've got them on board, you might have more luck with the mother, maybe.” [Tina, 45]

“Umm, I think women are more likely, especially as they get bigger if there's other bigger women in their class they're gonna feel more relaxed in that environment than what I call the gym bunnies, your size 8's. If you're suddenly a size 18, and you've gone from that 8,

you're gonna feel very disheartened even though you know you've got a baby, you're still gonna feel disheartened that they're looking like that. So I think if everybody is in the same boat, you're relaxed, you might be more keen to carry on. [Tina, 45]

“Yeah and discuss things with each other on what exercise they find quite easy maybe or a challenge.” [Tina, 45]

“But you know, I find, I do find as a whole you meet a couple, you know, when you go to the booking appointment they're a couple and they're both interested and they both want to do, you know, particularly the new parents, they want to do the best by the pregnancy so that is a majority for me but, uh, obviously there are the others that don't.” [Lucy, 46]

“...but yeah I do think, you know, you should encourage the partner cause it's, you know, it's a joint pregnancy isn't it? Yeah.” [Lucy, 46]

“...there was a teacher who used to come and do some exercises in the water for women and they enjoyed it and they continued postnatally. They would go in and put their baby in the car seat by the pool in the corner and they'd jump in for half an hour or an hour, whatever it was, and got the benefit and then went to have a cup of tea afterwards.” [Emma, 62]

“And I think actually it would be really good because then it gives women the chance to meet other women that are pregnant as well so it would really, it would really, umm, help to incorporate some women into groups that find it very difficult to come to groups, you know, if they're going to do an exercise class then they get to meet people every week at the same class.”  
“Umm, so they would build up a social network as well which is really important.” [Sally, 43]

“But if they, if they could book her up for the, if I could book her up or she has a class of six, I’d like to say that to them, and I’ve got two places left, why don’t you take one of those places? I said, go, you have a nice cup of coffee, you meet people and then if she enjoys it, she absorbs it, and so she’ll talk to somebody else, you know?” [Kate, 67]

“But if there was a collective fit class organised by a specialist person at the local Children’s Centre establishments where they all take their babies for nursery...” [Kate, 67]

“Yeah, yeah that’ll be brilliant, yeah, that’ll be really good and it’s not just the exercise that’s a whole social kind of thing. And also, you know, lots of evidence to say that exercise improves mental health and can be a, umm, a way of women combatting stress and those kinds of things, so yeah, definitely.” [Vicky, 50]

*Theme 7: “Selling” physical activity by challenging misconceptions and focusing on benefits.*

When asked, participating midwives were able to recognise the advantages and disadvantages of an active pregnancy as identified and perceived by pregnant women. However, midwives were divided in their opinion as to whether behaviour change campaigns should be focused on potential benefits to either mum or baby. Participating midwives recognised that pregnant women may have various concerns and excuses and felt the need to “sell” the idea of physical activity by challenging misconceptions and focusing on benefits.

“I don’t think lots of the mothers will actually think about development in the future of the baby. If they can’t think of that with breastfeeding, then I don’t think exercise that would be the area. I think it, it might be concentrating on their self-esteem, self-confidence, looking

good after having the baby, because quite often you think that you're the, the worst person in the world and perhaps their partners will go elsewhere, that's quite a main concern. Umm, so basically, look if you do your exercise or if we do this, you can look, you could build up self-esteem, you could lose a few pounds, because that's basically what they see exercise is, losing weight. Umm, I think build the women up themselves." [Sue, 55]

"Because to them, they're pregnant so they can be as fat as they like and it really doesn't matter. But they don't see the complications that come with it." [Louise, 50]

"...but in the scheme of things there's a lot of women that see pregnancy as a time to just sit and do nothing." [Tina, 45]

"I would say that, umm, like most things for pregnant women, you feel that you have to sell it, umm, and like the stop smoking, like all of the health things, umm, I would probably say it will make your birth easier and I would say that umm it will help with not gaining so much weight in your pregnancy, that that's not necessary and that you don't want to pile it on in pregnancy and they're the things that would help if you do some, you know, small amounts of exercise." [Amy, 40]

"I think the trouble with pregnancy is that it's, the baby is not very real until the baby is out, so it's like breastfeeding, when we're trying to sell breastfeeding, umm, you have to talk about the now rather than the future, and with the breastfeeding as another example I often talk about the calorie burning after and things like that and then you slip in the other advantages as you go along and they're like 'oh I didn't realise that, I didn't realise that'. And I'd say that is

probably a similar thing. It's about the now, because they can't see past their labour. Yeah, often their labour is the stop." [Amy, 40]

"Maybe time, especially if its, umm, mum who's already got children or first time mum busy working. So I think time. Tiredness, perhaps is an issue, or, or being scared, umm, you know, could it harm the baby, but then as a midwife, I'd hope I'd be able to reassure them." [Anne, 50]

"I think benefits to baby first and then to mum possibly." [Anne, 50]

"Women want all of it, they don't just want a specific, they want the easy birth, they want the healthy baby. I think you need to focus on the mother, if she's healthy, the baby is 90% of the time healthy." [Tina, 45]

"Umm, but actually, there are a few that, you know, see that pregnancy is an illness and umm, just, you know, don't want to go to work etc., so let alone do any exercise..." [Lucy, 46]

"But, umm, putting that aside, I would say the healthier you are the, uh, umm, you've got to, you know, for me, these ladies needs, got to be healthy up here as well and have the right approach to the pregnancy, have the right approach to the, umm, labour. Those ladies seem to do exceptionally well and those ladies that are, you know, who've got a little bit more, umm, awareness, they're the ones that look after themselves and eat healthily and, you know, kind of except what needs to be done in the pregnancy." [Lucy, 46]

“...I think that depends on your mum really. You know, umm, you’ve, I mean you’ve got your mum that sits down, she wants to know everything about pregnancy and she wants to gain, you know, she wants to do everything right by her pregnancy and her baby and then you’ve got the other one, you know, the other, the other mum that might still sit there smoking regardless of everything that you’ve told her about, you know, don’t smoke in pregnancy.” [Lucy, 46]

“...we know from, you know, previous experience and previous studies that have been done, women who are active, who are fit and who are healthy labour better, the outcome is better, so you do try and sell it to the women when they are asking or enquiring about exercise or even if I’m enquiring about exercise and then, and then again you’re sort of asking them, well do you know, umm, it is good to keep fit, to try and keep fit, don’t indulge, you know, being pregnant is not an excuse to eat for two, you know, and, you know, and have luxuries and think well, I’m going to put on weight so I don’t care anyway, you know, that kind of thing. So you sort of try and teach them to be healthy...” [Emma, 62]

“I think there needs to be more awareness if you like, there needs to be more awareness about physical fitness to then delivering a baby so to speak. I mean it is, it is, women have got to have stamina, you know, to be able to do this and there are a lot of women out there who are just couch potatoes, they don’t actually do anything, you know, and then they expect everything to actually happen or expect things to be done for them, so I don’t know how do we change that attitude.” [Emma, 62]

“Most people would probably react better to benefits to baby because they are doing it for somebody else. So, you know, mums aren’t selfish, you know, if it just comes down to their

health, a lot of people would probably think, oh well that's, you know, but if you're doing it for baby, that's why a lot of women say they give up smoking for baby's benefit and eat healthier for the baby, so yeah, I think you'd have to, to, you know, do the thing from the baby's benefit really, would get a better response, umm." [Sally, 43]

"On the women. Yeah, forget the baby. The baby's gonna be alright even though we know obese mothers will end up having obese children, I do know that. But there, although I do feel a lot of them are stupid, I, I think a lot of them are clever too in as much as, if I am well and healthy ergo my child would be. But if you say, oh for your baby, for your baby, I think you're gonna start bringing the shutters up. But, if you lose weight you will look lovely and your skin will get better, this will, if you exercise you'll feel vital, you'll feel sexy, you'll feel good, that sort of thing, that's, that's what I call motivation. Not rewards or we're sick to death of hearing the benefits of the unborn child." [Kate, 67]

"I don't use wondrous things for the baby, I focus on the women. This is for you, this is what it does for you and I think exercise should point that way. You know saying it's good for the baby too and for the kids cause if you're well, you'll impart that sort of ethos to your children who will want to play sports instead of sitting there like that." [Kate, 67]

"Yeah, I think probably, umm, maybe I would've thought to turn those around slightly and, you know, contribute to a healthier pregnancy first and, and in doing that maybe, you know, minimise the, the risk of excess weight gain. Umm, I think a lot of women worry about how they're changing body shape, especially younger women." [Vicky, 50]



“I think the mum because I think, you know, obviously her health affects the health of her, you know, unborn and then newborn and then subsequent, you know, years of childhood.”

[Vicky, 50]

“It’s about being a role model and, you know, so I think if women are, I don’t know, are motivated to be healthy then they’re more likely to make healthier choices for their children and their children are gonna see that from an early age, so yeah mum, definitely.” [Vicky, 50].

Theme 8: Suitable motivation, incentives and reward.

Most midwives believed that internal motivation as opposed to external rewards would be more effective in achieving long term behaviour change. However, some midwives were of the opinion that a reward or incentive should be used to attract pregnant women to join activities in the first instance. Participating midwives also suggested that incentives such as childcare vouchers could be used to address some of the barriers that pregnant women may be faced with.

“And for lots of ladies that’s quite good, rather than from what I’ve seen in the past, umm, they start off and they will fizzle out after a while, but if they’ve got, knowing that perhaps they can get free children’s places or, umm, I don’t know, whatever vouchers to use, umm, that will keep them going more.” [Sue, 55]

“Umm, I don’t know because surely the motivation has to come from within regardless of what we’re offering them and like I said, we were offering free classes and they still didn’t attend, so it’s changing that attitude isn’t it?” [Louise, 50]

“Yes, you’re more, if it’s, if it’s personal to you, you are likely to carry on, if it’s an incentive, it’s like when the smoking you were paid to give up smoking. How, how can they, how can you police, how can you manage and make sure that these people are doing that? No, I think it’s got to be personal for you, you’re more inclined to stick to it. That’s my personal view.” [Tina, 45]

“I think it would, yeah, I think maybe, umm, you know, it would, yeah any incentive gets people interested, but you would probably only spark interest in those people that maybe would have done it anyway, maybe they’d uptake it earlier or, or you know, would actually make the effort and go and do stuff if there was some incentive whether that was free or, you know, umm, but yeah I think people will either do it or I think it’s about making it realistic. You know it’s about making the goals realistic and the umm, activities realistic, you know.” [Amy, 40]

“I don't think they should be given anything to make an incentive, because being fit, well and healthy and having a healthy baby and having free access to facilities should be enough as an, as an, as incentive, you know.” [Anne, 50]

“But I think like anything, I think it needs somebody with a business kind of approach. I really think that sometimes if there is a reward for something then people will go.” [Emma, 62]

“...so I think, you know, the government really should put its money where its mouth is and give us appropriate health centres in the community to provide those kind of services because, and also, I do also think that the general public, uh, don't want to do anything for

nothing, always there must be some reward. So if anything is going to effect change, I think it would have to come from the Department of Health and have the right budget. And like you've said, we know that exercise is beneficial to all, you know, apart from giving everyone the feel good factor, it is healthy to have, you know, to get people out and about and do stuff." [Emma, 62]

"I don't think there should be any financial incentive to any women to exercise (laughing). That's, that's my opinion. I think, you know, we all should have the responsibility to keep ourselves healthy, not be paid to keep ourselves healthy, that's our responsibility." [Sally, 43]

"It's gotta be for them, for their, you know? And I, I, it's, this is what you can have for your wellbeing, this is what you will get after you've stopped smoking. Not if you stop smoking we'll give you something. In fact, I'm quite anti that." [Kate, 67]

"Yeah, I think probably the latter to be fair, because I think that if, if it's incentivised then possibly it's not gonna be ongoing or consistent, umm, and if you're talking about lifestyle change then it probably needs to be motivational rather than incentive I think, yeah." [Vicky, 50]

## **6.4 Discussion**

The purpose of this study was to gain insight into midwives' perspectives of providing exercise advice and guidance to pregnant women in the East Kent region of England. Interrelating themes were identified around three central organizing concepts: (i) midwives' perceived role

and responsibility in providing exercise advice and guidance, (ii) midwives' perceived barriers in providing effective exercise advice and guidance, and (iii) perceived opportunities in changing pregnant women's exercise behaviour. In presenting these findings, midwives views are also put in context of the recently published National Maternity Review (2016) which sets out the vision for maternity services in England over the next five years.

When considering their role and responsibility in providing exercise advice and guidance, participants commented that the profession of midwifery had evolved and that the resulting vicissitudes had consequences for their practise. Specifically, midwives experienced being subjected to increasing demands and expectations and their practise becoming defensive in nature. These findings echo that of the National Maternity Review (2016) "with an increasing administrative burden cited as a particular difficulty. This reduced the amount of time that could be spent with women, increasing the likelihood of mistakes and missed opportunities to spot problems. A perceived litigious culture was partly to blame..." (p. 38). Similarly, participating midwives perceived being exposed to greater risks.

With regards to providing exercise advice and guidance, midwives felt that they were ideally placed to do so but that it was ultimately up to pregnant women to take responsibility for their own health and wellbeing. Whilst being in control of their care is also the desire of pregnant women, Baroness Cumberland points out that "with this control comes a responsibility which mothers must accept and professionals must support – that personal health and fitness are integral to safe and fulfilling childbearing" (National Maternity Review, 2016, p. 4). However, given the increasing evidence that regular physical activity during pregnancy improves health outcomes for both mother and baby (Mudd et al. 2013), the onus is on midwives to disseminate

information that will allow pregnant women to make informed choices regarding their physical activity behaviours or indeed the consequences of a sedentary lifestyle.

Midwives in this study expressed their frustration with the fact that the responsibility of providing exercise advice and guidance is often a case of passing the buck between health and exercise professionals. However, as midwives are central to the care of pregnant women and given the fact that they “must have the ability to communicate effectively with all members of the maternity team, other professionals, women receiving care and their family members” (RCM, 2016, p. 7), it is not unreasonable to suggest that communication pathways should also include exercise professionals. Interprofessional communication, and indeed collaboration implies that knowledge and responsibility with regards to exercise advice, guidance, and motivation will be shared in such a manner that it meets the specific needs of a pregnant woman (McCallin, 2005). The notion of a collaboration between healthcare and exercise professionals was also identified as an opportunity to alleviate some of the time constraints of current practise. Participating midwives explained that they had access to additional care pathways and services for various health issues (e.g. obesity, diet, smoking, alcohol, etc.), however, for exercise there was nothing in place. Some midwives suggested that they could do the initial consultation and then refer suitable pregnant women to a separate service for further advice and guidance. Other midwives were, however, more sceptical about uptake of such services and suggested that pregnant women would give it “lip service” during the appointment and then not attend. Although there isn’t currently a referral pathway which include expecting women, the viability and cost-effectiveness of including pregnant women in the existing exercise referral scheme (NICE, 2014) or a similar service which could include health trainers, certified exercise professionals, or indeed specialist midwives should be explored. Future

research should also investigate the challenges and effectiveness of interprofessional collaboration between healthcare and exercise professionals in the context of antenatal care.

It was the view of some midwives in this study that pregnancy was too late to bring about change in pregnant women's lifestyle behaviours and that health issues should be addressed in preconception clinics. This rationale is in some way reflective of current thinking involving a life-course approach to women's health which "sets out to maximise every opportunity that the health service has with a woman to improve her lifestyle and her general health" (RCOG, 2011, p. 23). Indeed, the "women's health network" concept as proposed by the RCOG (2011) "believes that preconception care can improve maternal and newborn health by providing the foundation for a good pregnancy and birth experience", however, is also "of the opinion that pregnancy is the optimum time to help promote a healthy lifestyle and introduce preventative measures for reducing ill health in the mother and baby" (p. 1). Pregnancy presents multiple opportunities to influence the health and wellbeing of mothers and their children and may also be the first time that a woman and her family have continued contact with health services (National Maternity Review, 2016). Whilst the proposed women's health network is yet to materialise, maternity services are well established with opportunities to improve women's and children health being missed far too often. Midwives' role in securing better outcomes for mothers and babies in the broader context of population health needs to be made more explicit (Biro, 2011).

Echoing the findings of previous research (Weir et al., 2010; Olander et al., 2011; Stengel et al., 2012; Ferrari et al., 2013), this study found that midwives provided inadequate physical activity advice and guidance. Information was basic and limited to the initial booking appointment. Issues surrounding physical activity or lack thereof was not explored or revisited

later in the pregnancy unless it was brought up by the pregnant women themselves. Midwives reported that those women who were regular exercisers at the time of booking appointment were most likely to initiate further discussion. This detail is particularly interesting in the context of the findings in Study Two where regular exercisers scored significantly higher across all of the TPB measurements. Similar to the review by Heslehurst et al. (2014), the present study indicated variation in midwives' emphasis of physical activity during pregnancy with participating midwives reporting that information had to be prioritised according to importance and relevance.

In general, midwives felt that they were not equipped in providing effective exercise advice and guidance to pregnant women. The identified lack in training, knowledge, and confidence resulted in midwives not being able to address the issues surrounding physical activity exhaustively. However, given midwives' central positioning in the care pregnant women receive and the role they have in disseminating information, they must be provided with the opportunity to improve their knowledge and confidence (Olander et al., 2011). Although the need for greater investment in education and training is also highlighted in the National Maternity Review (2016), training around physical activity and public health is not mentioned specifically. Importantly, not any of the midwives participating in this study were aware of relevant training opportunities, however, they appeared willing to improve their knowledge and proposed that training should be facilitated on study days or as online CPD opportunities. A further suggestion was to identify a specialist lead midwife with the responsibility of training and updating other community midwives. It would, however, also seem relevant here to suggest that midwives would benefit from interprofessional collaboration with exercise professionals.

Time constraints were perceived by midwives as one of the most consuming barriers in providing effective exercise advice and guidance. Of consequence is how pregnant women perceive the resulting lack of information. Olander and colleagues (2011) point out that due to health professionals not having enough time to discuss gestational weight gain, pregnant women interpreted this as being unimportant. A further consequence of time constraints is that information and tasks are then prioritised which infers that the topic of physical activity is often neglected and expectant mums are not being presented with all the evidence allowing them to make informed decisions. The recent National Maternity Review (2016) recognises that changes will need to be made to midwifery staffing allocations so that midwives could “have more time to be able to explain a woman’s choices and personalise the advice she receives” (p. 96).

Midwives showed awareness of the potential social benefit of group activities aimed specifically at pregnant women and were keen to support these. However, there was a general lack of awareness in whether suitable exercise opportunities existed in the local community which implied that they were less likely to promote specific activities, such as aqua natal, but promoted general activities, such as swimming, instead. Similarly, Heslehurst and colleagues’ (2014) review suggest that healthcare professionals perceived a lack in supporting physical activity services being available to pregnant women. Pregnant women have, however, expressed a desire for “locally relevant information about the services available, and for there to be time to discuss the information with a healthcare professional” (National Maternity Review, 2016, p. 33).

Participating midwives recognised that engaging pregnant women’s partner could be beneficial in terms of the support and motivation they can provide. This sentiment is highlighted in the



National Maternity Review (2016) where expecting women stated that they “relied on their partner to support them in pregnancy and with the care of the baby and the NHS needed to recognise this and help their partners to help them” (p. 33). This finding is also interesting in the context of the multiphase research design framing this project as subjective norm, or the perceived social pressure to conform to how significant others think an individual should behave, has featured as an important construct influencing the exercise intentions of pregnant women throughout the study.

Being unaware of suitable resources to either draw on themselves or recommend to pregnant women presented midwives with a further barrier in providing effective exercise advice and guidance. Midwives elaborated on the fact that pregnant women could potentially “shut down” because of “information overload” during the pregnancy period and identified the need for simple and reliable resources (e.g. bullet style leaflets) and campaigns to be developed. It was also suggested that an app or online facility that was endorsed by the NHS could be useful as a motivational tool. This recommendation is consistent with the National Maternity Review (2016) whereby pregnant women are described as “savvy consumers” with a desire for “digital tools to help empower them in their decision-making” (p. 34). Interestingly, the report elaborates that the more empowered pregnant women felt by their digital experience, the more likely to were to approach healthcare professionals during face to face contacts.

A lack of training, knowledge and resources regarding exercise have resulted in midwives having to rely on common sense and their own experience to advise and guide pregnant women. However, pregnant women have “expressed frustration over receiving conflicting advice from different healthcare professionals throughout their care” and “wanted information to be evidence-based” (National Maternity Review, 2016, p. 33). Midwives participating in this

study have themselves also expressed the desire to be able to provide reliable and current information as part of evidence-based practise. It is therefore necessary that healthcare professionals take the initiative to invest in their own knowledge regarding current physical activity evidence, particularly, there is an increased focus in literature on the positive health outcomes for both mother and baby. For example, current meta-analytic evidence shows that regular exercise is associated with a reduced risk of gestational diabetes, a lower prevalence of excessive maternal weight gain (Sanabria-Martinez et al., 2015), and an increased probability of a normal delivery in healthy pregnant women (Poyatos-Leon et al., 2015). Healthcare professionals should use similar current evidence to inform practise, challenge exercise related misconceptions and elaborate on potential benefits.

Communicating about health behaviours have also brought to light perceived issues of vulnerability. Midwives disclosed a fear of not giving the right information, disappointing, upsetting, or potentially offending pregnant women. Similarly, Schmied, Duff, Dahlen, Mills, and Kolt (2011), reported that when discussing the issue of obesity, midwives who were overweight or obese themselves had described feeling either comfortable stating that they were not good role models or uncomfortable that their body image portrayed them as not being good role models. However, midwives who were normal or underweight also felt uncomfortable broaching the subject. Likewise, Foster and Hirst (2014) reported that midwives expressed concern about upsetting pregnant women as they risk spoiling the pregnancy and the relationship between them breaking down. Issues of vulnerability is thus a barrier to midwives being able to communicate effectively regarding health behaviours or as Foster and Hirst (2014) reported, absolving themselves from addressing issues such as obesity entirely.

A further issue that have left midwives in a position of vulnerability is their perception of being exposed to greater risk. Time constraints, lower staffing levels, and excessive caseloads increases the likelihood of omissions and mistakes being made. The ensuing threat of litigation and the associated costs involved have caused “midwives to practise in a risk-averse way, inhibiting their ability to support some of the choices that women may want to make, contributed to the administrative and data collection burden, and undermined multi-professional working” (National Maternity Review, 2016, p. 39).

However, despite facing several challenges, midwives identified eight feasible opportunities in changing pregnant women’s exercise behaviour, which included: (1) recognising and addressing barriers in the uptake and maintenance of exercise participation during pregnancy, (2) professional development, (3) interprofessional collaboration, (4) communicating effectively through simple, reliable resources, (5) improved access, availability and awareness of suitable activities in the local community, (6) encouraging a support network, (7) “selling” physical activity by challenging misconceptions and focusing on benefits, and (8) providing suitable motivation, incentives and reward. These suggestions and the issues raised by midwives should continue to be explored in both practise and research endeavours.

## **6.5 Conclusion**

The findings of this study show that midwives have an important role to play in disseminating exercise information, however, there are several barriers preventing them from providing effective exercise advice and guidance. Consequently, opportune moments are being missed to influence the health outcomes of both mothers and babies. There is an increased focus on improving the quality of maternity services in the UK and the present findings should not be

seen as a criticism of the care midwives provide but rather as opportunities to improve proficiency in providing exercise advice and guidance. In particular, midwives should not just focus on the individuals they consult with but consider their care in the context of the health of the broader population (Biro, 2011).

## **Chapter 7: Meta-inferences**

In the past two decades, mixed methods research has emerged as a necessary and appropriate approach to address complex phenomena in social, behavioural, and health sciences (Ivankova & Kawamura, 2010; Tashakkori & Teddlie, 2010). Using a multiphase design, this mixed methods research project sought to investigate the socio-cognitive factors influencing physical activity behaviour in the context of pregnancy. So far in this thesis, the results of the three studies within this design have been discussed individually and in relation to the research questions pertaining to each study. This chapter aims to discuss the themes that have developed through the course of the investigation and identify additional avenues for intervention and research. Interpretations of this kind at the end of a mixed methods research project have been labelled as “drawing conclusions”, “drawing inferences” or “meta-inferences” and serves the purpose of (a) improving the validity of the study, and (b) advancing the overall aim of the research project (Creswell & Plano Clark, 2011, p. 237). Specifically, triangulation was used to ascertain convergence, corroboration, and correspondence of the findings between individual studies (Greene et al., 1989).

### **7.1 Knowledge, information and resources**

Study One involved an elicitation study where the modal salient behavioural, normative, and control beliefs held by pregnant women in relation to them taking part in regular physical activity were identified. In terms of behavioural beliefs (i.e. those leading to the formation of attitude), it emerged that women were (1) unaware of the specific benefits that physical activity offered in terms of their pregnancy, and (2) showed little awareness of any potential benefits

to their baby. These findings suggested that pregnant women did not have access to the necessary information that would allow them to make informed decisions regarding their engagement in physical activities. In a recent qualitative study, Evans, Walters, Liechty, and LeFevour (2016) found that “a lack of knowledge or receiving misinformation or unclear advice” contributed to pregnant women experiencing uncertainty about the physical activities they could engage with (p. 396). This uncertainty quite often resulted in the participating pregnant women to rely on informal sources, such as the internet, as opposed to that of a health professional.

Indeed, Study Three of this research project showed that midwives did not discuss physical activity in any great detail and that they too lacked knowledge and consequently did not have confidence in disseminating exercise advice. Specifically, this study found that midwives provided only basic advice which was limited to the initial booking appointment, that is, issues affecting physical activity behaviour were not explored or revisited later in the pregnancy unless it was brought up by the pregnant women themselves. In addition, midwives reported being unaware of suitable resources to either draw on themselves or recommend to pregnant women which presented a further barrier in providing effective exercise advice and guidance. In recognising this shortcoming in their practise, midwives have expressed a need for reliable and evidence-based resources to be made available. In future, researchers should (a) develop suitable resources for midwives and pregnant women (e.g. bullet style leaflets, mobile apps, etc.), and (b) investigate the effectiveness of these resources as reference and motivational tools. As suggested by midwives, it would be particularly useful if these resources were developed in association with professional governing bodies (e.g. RCM, RCOG, etc.) and subsequently endorsed by the NHS.

Midwives attributed their lack of knowledge and confidence to a lack of training and suggested that further education could be facilitated through one of their mandatory study days or as an optional online CPD activity. Some midwives also suggested that the initial training of student midwives should incorporate the topic of physical activity which included the delivery of effective advice and guidance. Another suggestion involved the introduction of a specialist lead midwife post who would be responsible for updating other community midwives with emerging evidence. These suggestions all imply avenues for intervention and further investigation. For example, future research should explore whether additional training (or indeed an updated curriculum) results in more effective advice, improves midwives' confidence, changes pregnant women's attitudes, and increases the initiation and maintenance of regular physical activity. In their systematic review of interventions aimed at reducing the decline of exercise behaviour amongst pregnant women, Currie and colleagues (2013) reported that the two educational interventions included within the review, comprising only information provision (i.e. not including any behaviour change techniques), resulted in an increase in physical activity. They argue that this educational process enabled pregnant women to act on their intentions. This may be particularly relevant where attitude is a strong predictor of intentions and information provision serves as reinforcement or confirmation of the behavioural beliefs held by the individual.

Attitude is a construct which represents an individual's perception of the consequences that may result from participating in a specific behaviour (Ajzen & Fishbein, 1980; Ajzen, 1991; Fishbein & Ajzen, 2010). Together, attitude, subjective norm and PBC constitute the motivational factors that determine intention (Ajzen, 1991; Fishbein & Ajzen, 2010). In Study Two and within the context of the original TPB, it is important to note that attitude did not significantly influence pregnant women's intentions to be physically active. Attention should

simultaneously be drawn to the fact that beliefs are not always based on facts and reality and within this project it was found that the lack of information experienced by pregnant women clearly informed their beliefs. Therefore, according to the principles of the TPB it would be necessary to modify the underlying behavioural beliefs in order to bring about change in pregnant women's attitudes toward physical activity (Ajzen, 2005). Thus, future research should investigate how information provision or alternate educational interventions influences pregnant women's behavioural beliefs, attitudes, and subsequent intentions.

Despite issues of responsibility and vulnerability being raised by the midwives participating in this study, it is clear that the onus is on health professionals to disseminate information that will allow pregnant women to make informed decisions about their physical activity behaviours or indeed the consequences of a sedentary lifestyle. In a recent interview, Lesley Regan, newly appointed president of the RCOG, stated: "I do certainly [tell my patients]. And I sometimes get myself into trouble. Sometimes people who are very overweight get very, very defensive about it. But I do think it's very important and I think I have a responsibility to do that" (Bosely, 2016). Indeed, the National Maternity Review (2016) has emphasised that maternity services are in a unique position and they must recognise their role in supporting pregnant women and their families to reduce health inequalities by providing "the right care, support and information that take account of individual needs and barriers to health" (p. 58). Furthermore, given the increasing evidence regarding the effect of the intra-uterine environment on the health of babies, it is no longer acceptable to categorize physical activity information as irrelevant and unimportant and efforts should be made to actively promote and support increased participation.



## 7.2 Overcoming barriers

Study One revealed that in terms of control beliefs (i.e. those leading to perceptions of control and autonomy), pregnant women identified access and availability of suitable exercise opportunities, having adequate time and money, being knowledgeable about what is safe to do, and an activity format suitable to pregnant women (e.g. group activities) as factors that would enable or make it easy for them to exercise regularly. Conversely, health issues, not having enough time, fatigue, issues relating to caring for dependents (e.g. childcare), and not having access to exercise suitable opportunities were cited as factors that would make it difficult or prevent pregnant women from exercising regularly. These findings are similar to Gaston and Cramp's (2011) literature review of the patterns and determinants associated with exercise during pregnancy, where physical restrictions, tiredness, and lack of time were reported as the most common barriers.

Study Two of this project then showed that, in terms of the original TPB, perceptions of control did not directly influence pregnant women's exercise behaviour, however, it did play an important role in the formation of their intention to exercise. According to Ajzen (2005), the direct relationship between PBC and behaviour only occurs when perceptions of control matches an individual's actual control over the behaviour of interest. Thus, it can be inferred that pregnant women participating in this study did not have actual control of their exercise behaviour and their perception of the ease or difficulty with which they can participate in regular physical activity influenced their motivation as opposed to behaviour. Similarly, Evans et al. (2016) describe how the participants in their qualitative study associated pregnancy with a loss of control over their pregnant bodies and over their actions which affected the type and amount of physical activity they were able to engage with. Future research should explore

whether addressing barriers assist pregnant women in maintaining a sense of control and autonomy and whether these modifications in control beliefs facilitate a direct relationship between PBC and exercise behaviour.

In Study Three of this research project, midwives not only recognised the potential barriers that women encountered during pregnancy but they also identified opportunities in overcoming these. For example, midwives suggested that activities involving expectant mums should be subsidised and that a crèche facility should be provided. Regarding activity format, midwives were keen to support group activities aimed specifically at pregnant women which could serve the dual purpose of exercise participation and facilitating a social support network. Midwives also stressed that pregnant women's lifestyle and environment should be taken into consideration so that recommended levels of physical activity could be achieved by incorporating activities such as walking into everyday living. However, there was a general lack of awareness in whether suitable exercise opportunities existed in the local community which implied that general instead of pregnancy specific activities were promoted. Some midwives suggested that a separate referral pathway should be introduced to address physical activity as similar services already exist for other lifestyle factors such as diet, smoking, and obesity. Whilst not all midwives were receptive of this idea, it is clear that pregnant women need to be supported in overcoming barriers. Future studies should involve midwives in these types of interventions and explore the viability of co-ordinated efforts, such as an exercise referral pathway, to improve awareness, increase opportunities, and support pregnant women in initiating and maintaining regular physical activity throughout pregnancy.

### 7.3 Profiling

The main normative referents identified by participants in Study One were those who already enjoyed an active lifestyle, that is, participants believed that the pregnant women who were most likely to engage in exercise activities during their pregnancy were those already active at the time. This trend also became apparent in Study Three where midwives indicated that pregnant women who were physically active at the time of the booking appointment were most likely to initiate further discussion. Specifically, participating midwives recognised that women who were regular exercisers at the time of the booking appointment generally made enquiries as to whether they could continue whereas those who did not exercise regularly quite often made excuses for not doing so and the issues surrounding the behaviour was then not explored any further.

Study Two revealed that within the stable context of pregnancy, regular exercisers scored significantly higher across all of the TPB measurements with the greatest differences noted in intention (21.3 %) and future behaviour (31 %). However, it was interesting to note that regular pre-pregnancy exercise behaviour (i.e. unstable context) had a lesser effect on pregnancy exercise behaviour (13.7 %) and statistically significant differences were not present across all of the TPB variables. This is an important finding as it suggests behaviour status as a moderator of pregnant women's exercise intentions and behaviour. Thus, although the influence of exercise before pregnancy is important, it is crucial that these women continue to be physically active when a change in context occurs.

Whilst McEachan et al. (2011) suggest that such findings are of concern when devising behavioural interventions as past behaviour tendencies are not as easily changed as traditional

TPB variables, this scenario may present midwives, healthcare professionals and researchers with an opportunity to introduce tailored interventions based on the profiling of pregnant women according to intention and measures of past behaviour. Specifically, four types of intervention may be required that match both motivation and behaviour status: (1) women who have exercised regularly in the past and intend to continue being physically active throughout their pregnancy, i.e. inclined exercise maintainers, (2) pregnant women who have exercised in the past and do not intend to maintain their exercise routine, i.e., disinclined exercise renouncers, (3) women who have not exercised regularly but intend to be physically active during their pregnancy, i.e. inclined exercise adopters, and (4) pregnant women who have not exercised regularly in the past and do not intend to be physically active, i.e. disinclined exercise abstainers (see Figure 7.1). Future research should explore these scenarios as opportune moments to intervene and should also investigate which behaviour change techniques (BCTs) may be best suited to each. In addition to information provision or similar educational interventions, Currie and colleagues (2013) suggest individualised goal setting and action planning facilitated during face-to-face consultations as two techniques that can be employed to enable pregnant women to be more physically active. It may thus be a situation where midwives provide basic physical activity information and profile pregnant women at the booking appointment using a questionnaire such as the one developed for this study, and then makes a decision regarding the intervention most suited to the pregnant women's needs. For example, a disinclined exercise renouncer may be best supported by a "health trainer" (or similar health/exercise professional) whilst an inclined exercise maintainer could be supported by a midwife. It is, however, recognised that midwives felt that they were not equipped in providing effective exercise advice and guidance to pregnant women and it would therefore be necessary for midwives to improve their knowledge and confidence through additional training as this "could enhance delivery of health messages and intervention at routine patient

appointments” (Currie et al., 2013, p. 11). In addition, suitable exercise and health professionals would need to be identified in order to establish appropriate referral pathways.

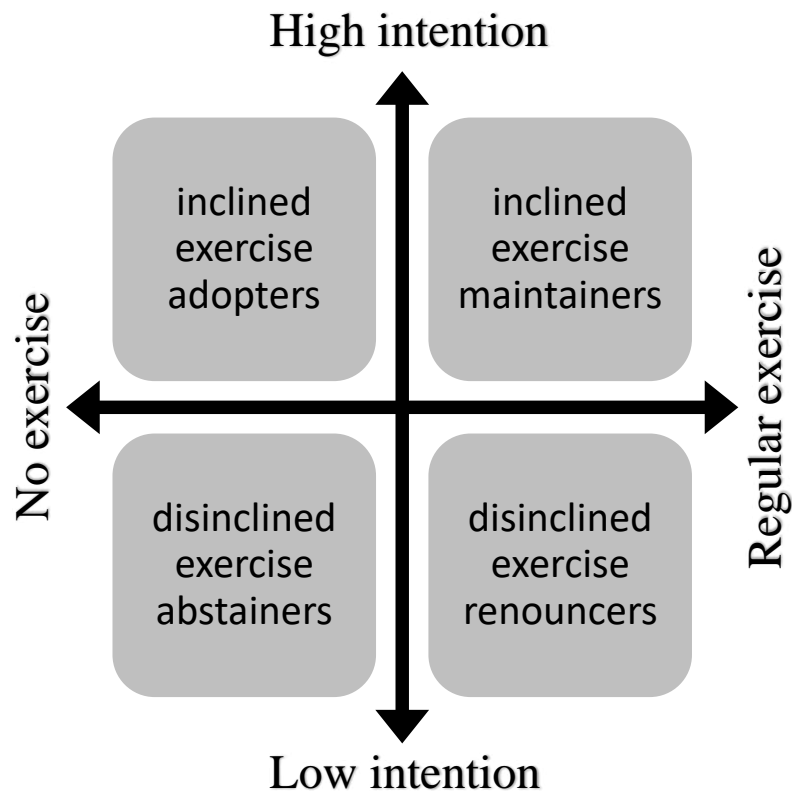


Figure 7.1: Intervening during pregnancy according to motivation and behaviour status.

The notion of profiling (or action control research) based on intention, exercise initiation, and exercise maintenance is not a novel one (McBroom & Reed, 1992; Sheeran, 2002). Action control research implies a two-step approach requiring (1) action planning involving intention formation, and (2) action control involving the translation of intentions into behaviour (De Bruin & Rhodes, 2011). Recent research has, however, also focused on the consideration of habit strength when constructing profiles and investigating the intention-behaviour gap. For example, De Bruin and Rhodes (2011) created eight profiles based on habit strength, intention, and meeting the guidelines for vigorous exercise (i.e. performing a minimum of 20 minutes of

vigorous intensity exercise for 3 days of the week) to study the exercise behaviour of 538 undergraduate students. The authors found that stronger exercise habits resulted in exercise behaviour being less reliant on intentions. Gardner (2015), however, suggests that where multifaceted behaviours such as physical activity is concerned, a further distinction should be made between habitually initiated (automatic) behaviour and habitually performed (conscious) behaviour. This distinction implies three types of “habitual behaviour”: (1) actions that are habitually initiated but consciously performed, (2) consciously initiated but habitually performed, and (3) habitually initiated and habitually performed (p. 251).

The profile matrix proposed here should serve as a manageable starting point for intervening to produce positive changes in pregnant women’s physical activity behaviour. In addition to considering the factors involved when a change in context occurs, future research could extend on these findings by exploring the mechanisms (e.g. habit formation and strength) through which past behaviour influence future behaviour.

## **Chapter 8: Conclusion**

### **8.1 Limitations**

Whilst this thesis has contributed to the existing body of perinatal research relating to physical activity behaviour, certain limitations have to be acknowledged.

Firstly, guidelines for the number of participants to be included in an elicitation study varies. For example, Godin and Kok (1996) suggest “about 25 individuals” (p. 97) whilst Fishbein and Ajzen (2010) recommend “a small sample” representative of the study population (p. 451). In Study One of this project, 39 pregnant women agreed to participate in the study, however, only 18 returned their completed questionnaires. Despite using techniques such as pre-paid envelopes for the return of completed documents, personalised reminders letters with original signatures on headed paper, and offering participants the choice of receiving a £5 high-street shopping voucher or for an equivalent charity donation to be made on their behalf, the response rate was only 46%. Nonetheless, regardless of the small sample, the concurrent validity of the modal salient behavioural, normative, and control beliefs identified in Study One was confirmed in Study Two and found to accurately represented the true beliefs of pregnant women in East Kent. Furthermore, in recognition of the poor response rate a strategy using multiple reminders and an increased incentive value (£10) was developed for Study Two (see Appendix L and M). Of the 164 pregnant women who subsequently agreed to participate, 116 returned their “Time 1” questionnaires (i.e. the response rate from recruitment to “Time 1” was 71%) and 89 completed the study (i.e. the response rate from “Time 1” to “Time 2” was 77%) representing an overall response rate of 54%. Future studies should devise strategies to retain

pregnant women as participants by considering additional and/or alternate techniques to those employed in this project.

Secondly, similar to the reviews by Poudevigne and O'Conner (2006) and Gaston and Cramp (2011), the present study demonstrated that physical activity decreases as pregnancy progresses. However, limitations with regards to this finding needs to be pointed out. Specifically, the PPAQ, a self-reported and self-administered questionnaire was used to measure the type, duration, frequency, and intensity of total activity in pregnant women. However, it was observed that pregnant women in this sample (Study Two) grossly overestimated their activity levels to the extent that their accounts were considered unrealistic (i.e. there were not enough hours in the day to account for the duration of activities as reported by some participants). It is possible that some pregnant women may have been concerned about the way they'd be perceived or thought that they had to portray a certain image (i.e. self-presentation bias; Fishbein & Ajzen, 2010). Nonetheless, it is recognised that the PPAQ is not primarily concerned with the absolute measurement of energy expenditure but rather with ranking individuals with respect to their physical activity levels (Chasan-Taber & Schmidt, 2016). It should also be noted that measures obtained by the PPAQ was not used in any analyses pertaining to the predictive utility of the TPB. Whilst the PPAQ is a useful tool in that it is quick, cost-effective and easy to administer, it may be more accurate when presented as an interactive visual tool representing average days consisting of 24 hours which include awake and sleeping hours. Furthermore, the PPAQ is a self-report questionnaire and future studies may wish to consider the objective measurement of pregnancy exercise behaviour. In their review of self-reported physical activity assessments relevant to pregnancy Evenson, Chasan-Taber, Symons Downs, and Pearce (2012), however, point out that objective measures (e.g. heart rate monitors, pedometers, accelerometers) are dependent on participant co-



operation with evidence indicating that not only is compliance lower among pregnant women as compared to the general population but it also declines toward the later stages of pregnancy. In addition, objective measurements are more expensive and have also been found to be problematic, for example, heart rate monitors using a chest strap are associated with discomfort as pregnancy progresses and readings can be difficult to interpret as heart rate is variable during pregnancy; accelerometers worn on the waist causes similar discomfort and have been found less accurate as it does not account for physical activity in a horizontal plane; and physical activity monitors are not always water-resistant yet many pregnant women enjoy the weightlessness associated with water-based activities (Symons Downs et al., 2012). Future research should consider improvements to both self-reported and objective measures of physical activity during pregnancy, specifically, more research needs to be done to (a) clarify the exercise-dose response relationship associated with health benefits during pregnancy; (b) establish the MET intensities associated with various physical activities during pregnancy; and (c) develop and investigate novel measures that are both cost-effective and reliable e.g. non-exercise activity thermogenesis (NEAT<sup>4</sup>; Levine, Vander Weg, Hill, & Klesges, 2006; Symons Downs et al., 2012).

Thirdly, in this study, behaviour status (i.e. whether or not participants were meeting the guidelines for moderate intensity physical activity) was identified as a moderator of pregnant women's exercise intentions and future behaviour. Behaviour status was measured as a dichotomous criterion and it would therefore have been useful to split and analyse the predictive utility of the TPB in terms of those who reported that they were exercising regularly (n = 43) and those who reported that they were not (n = 34). Indeed, it is recognised that the TPB variables may be more significant in the initiation of behaviour as opposed to the

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<sup>4</sup> NEAT refers to energy expenditure related to all activities apart from those associated with volitional sport and exercise participation (Levine et al., 2006).

maintenance thereof (Ayers & Olander, 2013). However, a split sample would have resulted in inadequate power and the role of past behaviour was therefore considered in terms of the reported frequency of past behaviour (frequency criterion). Future studies should take these methodical issues into consideration when considering the role of past behaviour within the TPB.

Finally, it is necessary to acknowledge the researcher's influence in this study and how this may have threatened the validity pertaining to Study Three (Sparkes & Smith, 2014). Whilst the interviewer was portrayed as an "outsider" and it was made clear that there were no right or wrong answers, it became apparent that the study in itself raised awareness of the topic prompting participants to discuss their practises with colleagues which may ultimately have influenced the interview discourse. This is illustrated in the following quotations:

"Do you know what, now, since meeting you and, you know, and umm, and speaking to the girls after they've spoken to you actually (laughing), I realised that we don't, umm, we don't put enough emphasis on exercise during pregnancy, well I, I know, myself, I don't."  
[Lucy, 46]

"Physical exercise, how could you change that? Since I've seen you, I talk about it more, does that help (laughing)." "I do speak about it more and I notice that generally, umm, collectively as a little group of midwives we've spoken about exercise more, cause we've all gone 'what do you do to promote' and it will be, it's quite interesting of what we all say and do..." [Louise, 50]

Although many qualitative studies involving midwives have been conducted regarding gestational weight gain and obesity, few studies have focused exclusively on physical activity. Nonetheless, the themes identified were similar to those of related studies. Furthermore, to instil confidence regarding the reliability of the themes identified and the interpretations thereof, findings were discussed in the context of the National Maternity Review (2016; source triangulation).

## **8.2 Strengths and contribution to knowledge**

The two major strengths of this research project lie in the fact that it utilized both mixed methods and theory to advance perinatal research. Indeed, mixed methods allowed both confirmatory and exploratory questions to be answered simultaneously (Teddlie & Tashakkori, 2003) whilst the TPB permitted scrutiny of the socio-cognitive factors influencing pregnant women's physical activity behaviour thereby providing a greater understanding and vantage point for intervention and further research. Therefore, in summary of the discussions presented, this thesis has contributed to existing knowledge by (a) identifying the modal salient behavioural, normative, and control beliefs of pregnant women in East Kent; (b) examining the predictive utility of the traditional TPB in a sample of pregnant women from the UK thereby allowing discussion and comparison with previous studies involving pregnant populations elsewhere; (c) demonstrating the direct relationship of past behaviour with intention and future behaviour in the stable context of pregnancy; (d) confirming that past behaviour as an additional variable significantly increases the predictive utility of the TPB; (e) exploring midwives perceived roles and responsibilities in relation to information provision; (f) identifying the barriers preventing midwives from providing effective exercise advice and guidance; and (f) enabling midwives in recognising opportunities to change pregnant women's

exercise behaviour. Finally, and perhaps most important, as a whole, this study has advanced the understanding of physical activity behaviour during pregnancy which not only moved the discourse along but may, in turn, result in more effective advice, guidance, motivation and support being available to pregnant women and their families.

### **8.3 Concluding thoughts**

By definition, motherhood implies “the state of being a mother” (Oxford Dictionaries, 2016). This thesis concludes, by arguing that this classification is a rather naïve description of a complicated journey accompanied by overwhelming responsibility that starts long before a woman becomes a mother. It has been 10 years since the introduction of the RCOG (2006a) guidelines and it appears that the evidence necessary to empower pregnant women to make informed decisions regarding their engagement in physical activities, is still not reaching them. In achieving better health and ensuring greater health outcomes for mothers and babies it is necessary to consider the factors involved in behaviour change, identify opportune moments to intervene, and involve health professionals in facilitating and supporting the lifestyle changes that may be required.

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## **APPENDICES**

## APPENDIX A



### Health Research Authority

#### NRES Committee London - Camberwell St Giles

Bristol Research Ethics Centre  
Level 3, Block B  
Whitefriars  
Levens Mead  
Bristol  
BS1 2NT

Telephone: 0117 342 1331  
Facsimile: 0117 342 0445

05 September 2013

Mrs Marilize De Vivo  
Researcher  
Canterbury Christ Church University  
Graduate School, Canterbury Christ Church University,  
North Holmes Road  
Canterbury  
CT1 1QU

Dear Mrs De Vivo

<b>Study title:</b>	<b>Physical activity beliefs, intentions and behaviours during pregnancy: an extension of the theory of planned behaviour.</b>
<b>REC reference:</b>	<b>13/LO/1397</b>
<b>Protocol number:</b>	<b>N/A</b>
<b>IRAS project ID:</b>	<b>122570</b>

Thank you for your letter of 2<sup>nd</sup> September 2013, responding to the Proportionate Review Sub-Committee's request for changes to the documentation for the above study.

The revised documentation has been reviewed and approved by the sub-committee.

We plan to publish your research summary wording for the above study on the NRES website, together with your contact details, unless you expressly withhold permission to do so. Publication will be no earlier than three months from the date of this favourable opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to withhold permission to publish, please contact the Co-ordinator Mr Thomas Fairman, [nrescommittee.london-camberwellstgiles@nhs.net](mailto:nrescommittee.london-camberwellstgiles@nhs.net)

#### **Confirmation of ethical opinion**

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

### **Ethical review of research sites**

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

### **Conditions of the favourable opinion**

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

*Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.*

*Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.*

*Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.*

*For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.*

*Sponsors are not required to notify the Committee of approvals from host organisations.*

**It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).**

**You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. The REC will acknowledge receipt and provide a final list of the approved documentation for the study, which can be made available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.**

### **Approved documents**

The documents reviewed and approved by the Committee are:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Covering Letter		29 July 2013
Covering Letter		02 September 2013
Evidence of insurance or indemnity		01 April 2013
Evidence of insurance or indemnity		01 April 2013
Evidence of insurance or indemnity		01 April 2013

Interview Schedules/Topic Guides	Study 3B (v 1.0)	01 June 2013
Investigator CV		
Letter from Sponsor		02 May 2013
Other: CV Dr Hayley Mills		
Other: CV Dr Mark Uphill		
Other: CV Dr Sabina Hulbert		
Other: Research notification letter		01 June 2013
Other: Tommy's letter		24 June 2013
Other: CCCU Data protection		01 February 2006
Other: CCCU Data storage and retention		01 August 2009
Other: CCCU research governance framework		01 April 2006
Participant Consent Form: Study 1	3.0	02 September 2013
Participant Consent Form: Study 2	3.0	02 September 2013
Participant Consent Form: Study 3a	3.0	02 September 2013
Participant Consent Form: Study 3b	3.0	02 September 2013
Participant Information Sheet: Study 1	3.0	02 September 2013
Participant Information Sheet: Study 2	3.0	02 September 2013
Participant Information Sheet: Study 3a	3.0	02 September 2013
Participant Information Sheet: Study 3b	3.0	02 September 2013
Protocol	2.0	17 June 2013
Questionnaire: Study 2 and 3A (PPAQ present)		
Questionnaire: Study 2 and 3A (PPAQ past)		
Questionnaire: Study 2 and 3A (TPB example)	1.0	01 June 2013
Questionnaire: Study 3A (Postpartum)	1.0	01 June 2013
Questionnaire: Study 1 (beliefs)	2.0	01 July 2013
Questionnaire: Study 1 (demographics)	2.0	01 June 2013
Questionnaire: Study 2 (demographics)	1.0	01 June 2013
Questionnaire: Study 3A (demographics)	1.0	01 June 2013
Questionnaire: Study 3B (demographics)	1.0	01 July 2013
Questionnaire: Study 3a Demographic Questionnaire	2.0	02 September 2013
REC application		19 August 2013
Referees or other scientific critique report		17 July 2013
Response to Request for Further Information		02 September 2013
Summary/Synopsis	1.0	01 July 2013

#### **Statement of compliance**

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

## **After ethical review**

### Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

### Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

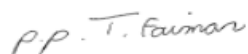
**13/LO/1397**

**Please quote this number on all correspondence**

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

With the Committee's best wishes for the success of this project.

Yours sincerely



**Mr John Richardson  
Chair**

Email: [nrescommittee.london-camberwellstgiles@nhs.net](mailto:nrescommittee.london-camberwellstgiles@nhs.net)

Enclosures: *"After ethical review – guidance for researchers"*

Copy to: *Mr Roger Bone*

*Dr Art Ationu, East Kent Hospitals University NHS Foundation Trust*

## APPENDIX B

East Kent Hospitals University   
NHS Foundation Trust

Please reply Research & Development Directorate  
Post Graduate Centre  
Buckland Hospital  
Coombe Valley Road  
Dover  
Kent.  
CT17 0HD  
Telephone: 01304 222561  
Fax: 01304 222690  
E-mail: art.ationu@nhs.net

15/10/2013

Marlize De Vivo  
Canterbury Christ Church University  
Graduate School  
Faculty of Applied Social Sciences  
Canterbury Christ Church University  
Canterbury  
CT1 1QU

Dear Marlize De Vivo

### **Physical activity beliefs, intentions & behaviour during pregnancy**

R&D Ref	2013/WOMHE/01
REC Ref	13/LO/1397

### **Documents received**

Protocol	17/06/2013
REC letters	05/09/2013
CCCU Governance letter	02/05/2013

Thank you for submitting the above referenced protocol to the R&D Department. I am pleased to confirm that your study has now been granted NHS Permission by the Trust provided that you comply with the conditions of Trust R&D NHS Permission which are attached.

**You are advised to study this letter and the attached Conditions of Trust NHS Permission carefully.**

### **NB - Commencement of the above trial is confirmation of your compliance to these Trust NHS Permission Conditions**

All research undertaken within the NHS requires both management NHS Permission from R&D offices, NHS Research Ethics Committee favourable opinion and any other applicable regulatory approvals. Research may not commence at any NHS site until these have been obtained.

You must ensure that you are fully aware of your responsibilities and that your activities are conducted in line with the Local Research Governance Framework for Health and Social Care 2<sup>nd</sup> Edition, Research Ethics Committee conditions, The Medicines for Human Use (Clinical Trial) Regulations 2004 and Amendment Regulations 2006.



Pharmaceutical clinical trials involving an investigational medicinal product shall be conducted in accordance with the conditions and principles of International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH GCP)

Investigators of other research should be conducting their activities to similar standards and good clinical practice systems.

#### **Safety Reporting**

Researchers should follow the safety reporting requirements of the protocol and study sponsor, Trust R&D SOP9, - Serious Adverse Event Reporting, and the Trust Policy for the Management of incidents <http://www.ekhuft.nhs.uk/staff/systems/datix-incident-reporting/>. All staff are responsible for reporting adverse incidents, whether or not related to research in accordance with the above.

#### **Amendments**

The study sponsor is responsible for ensuring that amendments are submitted, as applicable, to the REC and the MHRA, and for ensuring that amendments are notified to PIs and the R&D Department. The sponsor is responsible for providing any updated documentation and regulatory approvals to the PI/research team.

Principal Investigators must ensure that amendments are not implemented until all applicable regulatory approvals and R&D acceptances are in place (unless an urgent safety measure).

Further guidance and examples of substantial and non-substantial amendments can be found on the NRES website [www.nres.nhs.uk](http://www.nres.nhs.uk)

#### **Service Support Departments – Medical Records, Radiology, Pathology, Pharmacy**

Principal Investigators participating in a CTIMP are responsible for identifying trial patients in the study on all referral requests to service support departments such as Pathology, Radiology, Pharmacy and medical records are marked for retention. This will enable the necessary archiving in compliance with the Medicines for Human Use (Clinical Trials) Regulations [SI 2004 1031] & Amendment Regulations 2006 [SI 2006 1928].

Principal Investigators are required to regularly provide relevant support departments with a list of patients recruited into studies.

Service Support Departments (SSDs), (if supporting the study) should be notified immediately of any amendments to the study and provided with a current version of the protocol.

#### **Monitoring**

The sponsor is responsible for ensuring studies are appropriately monitored, particularly CTIMPs

The R&D Department may conduct on-site monitoring visits on a risk-based basis.

All Principal Investigators will have access to the R&D Database – Reda - to upload study documents and study information. As a condition of Trust NHS Permission Investigators are required to use the Reda database to provide regular updates to R&D on their studies,

#### **Accrual**

**It is a condition of NHS Permission that PIs regularly provide accrual figures by uploading this information to Reda database. Failure to provide such information may result in the withdrawal of Trust NHS Permission.**

**End of Study Reports**

Researchers must submit End of Study reports to R&D when all study activity, including recruitment, follow-up etc, has ended.

**Training**

For all interventional studies, including CTIMPs, medical devices etc, you agree to attend Good Clinical Practice training and updates. The PI is responsible for ensuring that the research team are competent and appropriately qualified to carry out their research roles, and have received appropriate GCP training. The PI is also responsible for ensuring the research team have trial specific training, particularly in completing CRFs and reporting of SAEs.

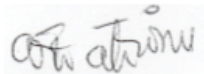
**Delegation logs**

Principal Investigators are responsible for ensuring that an up to date delegation log for the study is maintained detailing the roles and responsibilities delegated to research team members.

**Breach of NHS Permission conditions**

Failure to comply with these conditions or failure to provide the information when requested will result in the study being suspended and may lead to Trust approval being withdrawn.

Yours sincerely



Dr Art Ationu (BSc, MSc, PhD, PG Dip, CBiol, MIBiol, CSci, FIBMS)  
R&D Manager

Attached: Conditions of Trust NHS Permission  
Pharmacy cover note

Copy to: Madeline Harris, Consultant Midwife, KCH  
Roger Bone, Research Governance Manager, Canterbury Christ Church University

## APPENDIX C

East Kent Hospitals University   
NHS Foundation Trust

Please reply to: Research & Development Directorate  
Buckland Hospital  
Coombe Valley Road  
Dover CT17 0HD

Telephone: 01304 222550  
Fax: 01304 222550  
E-mail: [art.tionu@ekht.nhs.uk](mailto:art.tionu@ekht.nhs.uk)

6 December 2013

Mrs Malize De Vivo  
2 Bay View  
Helena Corniche  
Sandgate  
Kent  
CT20 3TE

Dear Mrs De Vivo

**Letter of access for Research Study:  
Physical Activity Beliefs, intentions and behaviour during pregnancy**

**R&D Ref: 2013/WOMHE/01**

This letter confirms your right of access to conduct research through **East Kent Hospitals University NHS Foundation Trust** for the purpose and on the terms and conditions set out below. This right of access commences on **6<sup>th</sup> December 2013** and ends on **3<sup>rd</sup> October 2016** unless terminated earlier in accordance with the clauses below.

You have a right of access to conduct such research as confirmed in writing in the letter of permission for research from this NHS organisation. Please note that you cannot start the research until the Principal Investigator for the research project has received a letter from us giving permission to conduct the project.

The information supplied about your role in research at **East Kent Hospitals University NHS Foundation Trust** has been reviewed and you do not require an honorary research contract with this NHS organisation. We are satisfied that such pre-engagement checks as we consider necessary have been carried out.

You are considered to be a legal visitor to **East Kent Hospitals University NHS Foundation Trust** premises. You are not entitled to any form of payment or access to other benefits provided by this NHS organisation to employees and this letter does not give rise to any other relationship between you and this NHS organisation, in particular that of an employee.

While undertaking research through East Kent Hospitals University NHS Foundation Trust, you will remain accountable to **Canterbury Christ Church University** but you are required to follow the reasonable instructions of **Madeleine Harris, Consultant Midwife** in this NHS organisation or those given on her/his behalf in relation to the terms of this right of access.

Where any third party claim is made, whether or not legal proceedings are issued, arising out of or in connection with your right of access, you are required to co-operate fully with any investigation by this NHS organisation in connection with any such claim and to give all such assistance as may reasonably be required regarding the conduct of any legal proceedings.

You must act in accordance with **East Kent Hospitals University NHS Foundation Trust** policies and procedures, which are available to you upon request, and the Research Governance Framework.

You are required to co-operate with **East Kent Hospitals University NHS Foundation Trust** in discharging its duties under the Health and Safety at Work etc Act 1974 and other health and safety



legislation and to take reasonable care for the health and safety of yourself and others while on **East Kent Hospitals University NHS Foundation Trust** premises. You must observe the same standards of care and propriety in dealing with patients, staff, visitors, equipment and premises as is expected of any other contract holder and you must act appropriately, responsibly and professionally at all times.

If you have a physical or mental health condition or disability which may affect your research role and which might require special adjustments to your role, if you have not already done so, you must notify your employer and the Trust R&D Department/Occupational Health Department prior to commencing your research role at the Trust.

You are required to ensure that all information regarding patients or staff remains secure and *strictly confidential* at all times. You must ensure that you understand and comply with the requirements of the NHS Confidentiality Code of Practice (<http://www.dh.gov.uk/assetRoot/04/06/92/54/04069254.pdf>) and the Data Protection Act 1998. Furthermore you should be aware that under the Act, unauthorised disclosure of information is an offence and such disclosures may lead to prosecution.

You should ensure that, where you are issued with an identity or security card, a bleep number, email or library account, keys or protective clothing, these are returned upon termination of this arrangement. Please also ensure that while on the premises you wear your ID badge at all times, or are able to prove your identity if challenged. Please note that this NHS organisation accepts no responsibility for damage to or loss of personal property.

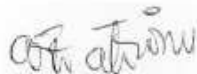
We may terminate your right to attend at any time either by giving seven days' written notice to you or immediately without any notice if you are in breach of any of the terms or conditions described in this letter or if you commit any act that we reasonably consider to amount to serious misconduct or to be disruptive and/or prejudicial to the interests and/or business of this NHS organisation or if you are convicted of any criminal offence. Where required by law, your HEI employer will initiate your Independent Safeguarding Authority (ISA) registration, and thereafter, will continue to monitor your ISA registration status via the on-line ISA service. Should you cease to be ISA-registered, this letter of access is immediately terminated. Your employer will immediately withdraw you from undertaking this or any other regulated activity. You MUST stop undertaking any regulated activity.

Your substantive employer is responsible for your conduct during this research project and may in the circumstances described above instigate disciplinary action against you.

**East Kent Hospitals University NHS Foundation Trust** will not indemnify you against any liability incurred as a result of any breach of confidentiality or breach of the Data Protection Act 1998. Any breach of the Data Protection Act 1998 may result in legal action against you and/or your substantive employer.

If your current role or involvement in research changes, or any of the information provided in your Research Passport changes, you must inform your employer through their normal procedures. You must also inform your nominated manager in this NHS organisation.

Yours sincerely



Dr Art Ationu (BSc, MSc, PhD, PG Dip, CBiol, MIBiol, CSci, FIBMS)  
R&D Manager

cc: **Dr Hayley Mills, Senior Lecturer, Canterbury Christ Church University**  
**Madeleine Harris, Consultant Midwife, EKHUFT**

## APPENDIX D

**Tommy's**

24<sup>th</sup> June 2013

To whom it may concern,

This letter is to confirm that Marlize De Vivo of Canterbury Christ Church University has registered to raise funds for Tommy's. We would be very grateful if you could help in any way that you can.

Tommy's fund research into pregnancy problems and provides information to parents. We believe it is unacceptable that one in four women will lose a baby during pregnancy and birth.

If you have any queries, please feel free to contact me directly, I've added my details at the end of this letter.

With many thanks for helping Marlize to support Tommy's; we are very grateful.

---

Best wishes,

Jacqui Clinton  
Health Campaigns Director  
Tommy's  
0207 398 3409

TOMMY's is registered charity no 1060508 and SC039280

## APPENDIX E

Graduate School  
Canterbury Christ Church University  
North Holmes Road  
Canterbury  
Kent  
CT1 1QU

Date

Location Name  
First line of address  
Town  
Kent  
Postcode

For attention of the Manager,

### Research Project Notification

As a matter of courtesy, I am writing to inform you that I will be carrying out a research project in East Kent over the next 3 years as part of my doctoral studies. In particular, I will be recruiting and collecting data from pregnant women and it is likely that the antenatal clinic held at X might be selected at random to be included in the research project.

Permission to carry out the study has been granted by the East Kent Hospitals University NHS Foundation Trust (Ref: 2013/WOMHE/01). In addition, the proposed research project has been reviewed and given favourable opinion by the National Research Ethics Service Committee of London - Camberwell, St. Giles (Ref: 13/LO/1397).

If you have any questions or would like more information about the research project, please contact me on the details below.

Sincerely,

Marlize de Vivo  
Researcher  
(+44)7914818319  
m.de-vivo319@canterbury.ac.uk

## **APPENDIX F**

Study1.Info.September2013.Version3.0



### **PARTICIPANT INFORMATION SHEET**

#### **Exploring the exercise beliefs of pregnant women in East Kent**

You have been invited to take part in this research project because you have attended an antenatal appointment on a day that the researcher was in the clinic. You do not have to take part in this study, but before making your decision, you need to understand why the study is being carried out and what it would involve. The researcher will go through this information sheet with you and answer any questions you may have. This should take between 10 and 15 minutes. Please ask if there is anything that is unclear.

#### **About the study**

This study is designed to investigate how women feel about exercise during pregnancy and the things that influence those opinions. As well as providing some background information, we will ask you to fill in a questionnaire. In return we will offer you the choice of receiving a high-street shopping voucher to the value of £5 or for us to make a £5 donation on your behalf to the charity Tommy's.

We will analyse the information you provide and use it to develop a questionnaire based on women's beliefs about exercise during pregnancy. We may contact you again to fill in this new questionnaire and to provide feedback about it. If this is the case, and in return for your time and contribution, you will again be able to choose whether to receive a high-street shopping voucher to the value of £5 or for us to make a £5 donation on your behalf to the charity Tommy's.

To take part in this research study you must:

- be at least 18 years of age;
- have a good standard of English;
- have conceived naturally;
- have not had more than one miscarriage; and
- have no previous or existing condition which might be caused or made worse by pregnancy (for example, asthma, diabetes, high blood pressure and so on).

Unfortunately, we cannot promise that the study will be of immediate benefit to you, but the details we collect may provide more specific information about the way in which exercise guidance is provided to pregnant women in the future. We will use the findings from this study to inform future studies, and they may be published in academic journals or summarised into a report for the various organisations involved.

#### **Your rights**

It is up to you to decide whether to take part in this study. If you agree, we will then ask you to sign a consent form. You will be able to withdraw from the study at any time, without any

consequences. This would not affect the standard of care you receive. If you choose to withdraw from the study, we would like to use the information you have contributed up to that point. However, if you prefer, you have the right to ask us to destroy all or part of the information you have provided.

Throughout the study, all details and personal information that we collect about you will be stored securely within Canterbury Christ Church University premises in line with the Data Protection Act (1998) and the university's own data protection requirements. Only the researcher and the people directly involved in this study will have access to the information you provide. At the end of the study, we will make all information anonymous (that is, we will remove all personal details associated with the information). This means that you will not be identified in any report or publication resulting from this study.

#### **About the researcher**

The chief investigator in this study is Marlice De Vivo, who is a doctoral student at Canterbury Christ Church University. If at any time you have a concern or question about the nature, procedures or requirements for taking part in this study, please contact the researcher. If, however, you are still unhappy after doing this, and would like to make a formal complaint, you can do so by contacting the researcher's supervisor (see below for details).

Marlice de Vivo  
Chief Investigator  
Graduate School  
Canterbury Christ Church University  
North Holmes Road  
Canterbury  
Kent  
CT1 1QU  
Phone: 0791 481 8319  
Email: m.de-vivo319@canterbury.ac.uk

Dr Hayley Mills  
Supervisor  
Department of Sport Science, Tourism and Leisure  
Canterbury Christ Church University  
North Holmes Road  
Canterbury  
Kent  
CT1 1QU  
Phone: 01227 767700 (extension 3294)  
Email: hayley.mills@canterbury.ac.uk

**Thank you for taking the time to read this information sheet and congratulations on your pregnancy!**

**Please keep this document as you may want to read it again in the future.**





## APPENDIX G

Study1.Consent.September2013.Version3.0



### **PARTICIPANT CONSENT FORM**

**Title of Project:** Exploring the exercise beliefs of pregnant women in East Kent.

**Chief Investigator:** Marelize de Vivo

#### **SECTION A: To be completed by the participant**

**Please read each statement carefully and initial the box:**

1. I confirm that I am 18 years of age or older and meet the participation criteria for this study.
2. I confirm that I have read and understood the information sheet dated September 2013 (version 3.0) for the above study.
3. I have had the opportunity to consider the information, to ask questions and have had these answered satisfactorily.
4. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
5. I agree for any data that is collected as part of this project to be used should I choose to withdraw from the study.
6. I agree to take part in the above study.

**Name of Participant:**

**Date:**

**Signature:**

**Address:**

**Tel:**

**Email:**

**SECTION B: To be completed by the researcher**

**Chief**

**Investigator:**

**Date:**

**Signature:**

**Please return one signed document and retain the other for your records.**

## APPENDIX H

Study1.Demographics.June2013.Version2.0



**Participant coding number:**

**Today's Date:**

This questionnaire consists of three sections. Please follow the instructions for each section carefully. Remember, any information you provide will be treated as confidential and will be used solely for the purpose of this research project.

**SECTION A: SOME INFORMATION ABOUT YOU**

This section consists of eight questions. Where appropriate, please use a cross (X) to indicate your answer. Please make sure that you have answered all the questions before moving to section B.

**1. What is your age (in years)?**

--

**2. Is English your main language?**

Yes		No	
-----	--	----	--

(a) If no, what is your main language?

--

**3. What is your current marital status? Are you...?**

Single (never married or never registered a civil partnership and not living with partner)	
Cohabiting (not married or in civil partnership but living with partner)	
Married or in a civil partnership	
Separated (but still legally married or still legally in a civil partnership)	
Divorced or formerly in a civil partnership which is now legally dissolved	
Widowed or surviving partner from a civil partnership	

**4. How would you describe your national identity (i.e. belonging to a particular nation by origin, birth, or naturalization)? Please choose all that apply.**

English	
Welsh	
Scottish	
Northern Irish	
British	
Other, please describe:	

**5. What is your ethnicity? Select the option that best represents the cultural factors which define your ethnic group or background.**

<b>White:</b>	
British/English/Welsh/Scottish/Northern Irish	
Irish	
Gypsy or Irish Traveller	
Any other White background, please describe:	
<b>Mixed/Multiple ethnic groups:</b>	
White and Black Caribbean	
White and Black African	
White and Asian	
Any other Mixed/Multiple background, please describe:	
<b>Asian or Asian British:</b>	
Indian	
Pakistani	
Bangladeshi	
Chinese	
Any other Asian background, please describe:	
<b>Black/African/Caribbean or Black British:</b>	
African	
Caribbean	
Any other Black/African/Caribbean background, please describe:	
<b>Other Ethnic Background:</b>	
Arab	
Any other ethnic background, please describe:	

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

No formal qualifications	
Entry Level Certificates	
Level 1 or equivalent (e.g. GCSE's grades D-E).	
Level 2 or equivalent (e.g. GCSE's grades A-C).	
Level 3 or equivalent (e.g. A Level).	
Level 4 or C (e.g. certificates of higher education)	
Level 5 or I (e.g. diplomas of higher education, foundation degrees and higher national diplomas).	
Level 6 or H (e.g. bachelor degrees, graduate certificates and diplomas).	
Level 7 or M (e.g. masters degrees, postgraduate certificates and diplomas).	
Level 8 or D (e.g. doctorates and specialist awards).	

**7. Which of these statements best describe your employment status?**

I do not have a job at this time but I have been actively seeking work in the past four weeks and will be available to start work in the next two weeks; or I do not have a job at this time but I have found a job, and I am waiting to start it in the next two weeks.	
I do part-time/full-time paid work (as an employee or self-employed); or I had a job but I am temporarily away from it; or I am on a government-supported training and employment program; or I do unpaid family work.	
I do not have a job at this time, I have not actively sought work in the last four weeks and/or I am not available to start work in the next two weeks.	

**8. Your household income represents the total income (salaries, benefits, dividends, etc.) from all the people living in your home. These people do not have to be related. What do you estimate is your annual household income?**

--

**SECTION B: SOME INFORMATION ABOUT YOUR PREGNANCY**

This section consists of ten questions, some of which may not apply to you. However, please read all the questions carefully to make sure that you have not omitted any information. Where appropriate, please use a cross (X) to indicate your answer.

**9. When is your estimated due date?**

--

**10. What is the date of your last menstrual cycle (if known)?**

--

**11. How many weeks are you pregnant (if known)?**

--

**12. Are you expecting more than one baby?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

(a) If yes, how many babies are you expecting?

--

**13. Is this your first pregnancy?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

**If yes, please proceed to Section C. If no, please answer questions 14-18 before moving to Section C.**

**14. How many times have you been pregnant before?**

1	<input type="checkbox"/>
2	<input type="checkbox"/>
3	<input type="checkbox"/>
More than 3	<input type="checkbox"/>

**15. How many children do you have?**

1	
2	
3	
More than 3	

**16. How old were you when you became pregnant for the first time?**

**17. How many of your previous pregnancies ended in...?**

A live delivery between 37 and 41 weeks	
A premature birth (<37 weeks)	
Induced labour (>41 weeks)	
Stillbirth	
Miscarriage	
Other	

**18. Did you have any complications during a previous pregnancy?**

Yes		No	
-----	--	----	--

(b) If yes, please give details:



**SECTION C: SOME INFORMATION ABOUT YOUR EXERCISE PREFERENCES**

This section consists of two questions. Where appropriate, please use a cross (X) to indicate your answer. Please make sure that you answer all the questions.

**19. In the 12 months before your current pregnancy, did you participate in any leisure or sports activities on a regular basis?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

(a) If yes, please describe the main activity or activities and how often you participated (e.g. netball - 3 times per week for at least 60 minutes, running - 3 times per week for at least 30 minutes):

**20. Do you currently participate in any leisure or sports activities on a regular basis?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

(a) If yes, please describe the main activity or activities and how often you participate (e.g. yoga - 3 times per week for at least 45 minutes, walking the dog - 4 times per week for at least 15 minutes):

You have now reached the end of this questionnaire. Please make sure that you have answered all the questions that apply to you before returning the questionnaire to the researcher in the envelope provided.

Thank you!

## **APPENDIX I**

Study1 Beliefs July 2013 Version 2.0



**Participant coding number:**

**Today's Date:**

Please take a few minutes to tell us how you feel about exercising during your pregnancy. There are no right or wrong answers; we are simply interested in your personal opinions. For each question, please list the thoughts that come immediately to mind and then write each thought on a separate line. This questionnaire consists of five sections (A-E). Please complete all sections, however, if this is your first pregnancy, please disregard Section D Part 3.

**EXERCISE BELIEFS QUESTIONNAIRE**

(adapted from Fishbein & Ajzen, 2010)

**Definition of exercise:**

Exercise forms part of our daily lives and can take on many forms. Sometimes we may not even realise that we are in fact exercising. For the purpose of this questionnaire exercise is therefore defined as any regular moderate physical activity that requires you to expend energy. For example, performing any one or a combination of the following activities on at least 4 days of the week: walking 2 miles in 30 minutes, gardening for 30-45 minutes, pushing a stroller 1.5 miles in 30 minutes, washing floors/windows for 45-60 minutes, swimming for 20 minutes, dancing for 30 minutes, running 1.5 miles in 15 minutes, etc.

**SECTION A:**

1. What do you see as the advantages of you exercising during your pregnancy?


2. What do you see as the disadvantages of you exercising during your pregnancy?


**SECTION B:**

When it comes to you exercising during your pregnancy there might be individuals or groups who would think that you should or should not perform this behaviour.

1. Please list the individuals or groups who would approve or think you should exercise during your pregnancy.


2. Please list the individuals or groups who would disapprove or think you should not exercise during your pregnancy.


Sometimes, when we are unsure what to do, we look to see what others are doing.

3. Please list the individuals or groups who you think are most likely to exercise during their pregnancy.


4. Please list the individuals or groups who you think are least likely to exercise during their first trimester of pregnancy.


**SECTION C:**

1. Please list any factors or circumstances that would make it easy or enable you to exercise during your pregnancy.


2. Please list any factors or circumstances that would make it difficult or prevent you from exercising during your pregnancy.


**SECTION D:**

**Part 1:**

1. How does the idea of exercise during pregnancy make you feel?


2. Do you think that there is any particular reason for you feeling this way?


**Part 2:**

Sometimes, when we are unsure what to do, we rely on our own experience for guidance.

1. Think back to the exercise(s) that you participated in prior to (this) pregnancy and then list the activities that you would consider doing during your pregnancy?


2. Think back the exercise(s) that you participated in prior to (this) pregnancy and then list the activities that you would avoid doing during your pregnancy?


3. Think about your involvement in exercise prior to (this) pregnancy and then list those experiences that would inspire you to take up or continue with exercise during your pregnancy.


4. Think about your involvement in exercise prior to (this) pregnancy and then list those experiences that would deter you from taking up or continuing with exercise during your pregnancy.


**Part 3 (skip if this is your first pregnancy):**

Sometimes, when we are unsure what to do, we rely on our own experience for guidance.

1. Think about the exercise(s) that you have participated in during your previous pregnancy and then list the activities that you would consider doing during this pregnancy?


2. Think about the exercise(s) that you have participated in during your previous pregnancy and then list the activities that you would avoid doing during this pregnancy?


3. Think about your involvement in exercise during your previous pregnancy and then list those experiences that would inspire you to take up or continue with exercising during this pregnancy.




4. Think about your exercise experience during your previous pregnancy and then list those experiences that would deter you from taking up or continuing with exercising during this pregnancy.


**Part 4:**

Sometimes, when we are unsure what to do, we rely on other's experience for guidance.

1. Think about the exercise(s) that you have seen or heard others do during their pregnancy and then list the activities that you would consider doing during your pregnancy?


2. Think about the exercise(s) that you have seen or heard others do during their pregnancy and then list the activities that you would avoid doing during your pregnancy?


3. Think about what you have heard or seen around others involvement in exercise during their pregnancy and then list those experiences that would inspire you to take up or continue with exercising during your pregnancy.


4. Think about what you have heard or seen around others involvement in exercise during their pregnancy and then list those experiences that would deter you from taking up or continuing with exercising during your pregnancy.


**SECTION E:**

Is there anything else that comes to mind with regards to the following scenarios?

1. Exercise during your pregnancy.


2. Exercise prior to this pregnancy.


3. Exercise during a previous pregnancy.


You have now reached the end of this questionnaire. Please make sure that you have answered all the questions that apply to you before returning the questionnaire to the researcher in the envelope provided.

Thank you for your participation!

**APPENDIX J**

EKEBP (version 1.0)



**Participant coding number:**

**Today's Date:**

## **EAST KENT EXERCISE BELIEFS IN PREGNANCY QUESTIONNAIRE**

This survey is part of a research project with the aim of investigating why pregnant women do or do not exercise during pregnancy. Specifically, we are interested in your opinion about taking part in regular moderate physical activity during your pregnancy.

It is important to recognise that exercise forms part of our daily lives and can take on many forms. Sometimes we may not even realise that we are in fact exercising. For the purpose of this questionnaire regular exercise is defined as any moderate physical activity (e.g. yoga, gardening, water aerobics, housework, etc.) that requires you to expend energy whilst still being able to hold a conversation (e.g. walking briskly at a pace of 3 miles per hour) and is performed continuously for 15 to 30 minutes on at least four days of the week during your pregnancy.

### **Instructions:**

- Please answer all the questions.
- Many of the questions in this survey make use of rating scales with seven places; please circle the number that best reflects your opinion at this moment in time.
- Do not circle more than one number on a single scale.
- Although some questions may appear similar, they each address a somewhat different issue; please make sure that you read each question carefully.
- Remember, there are no correct or incorrect answers; we are simply interested in your personal point of view.
- When completed, please place and seal the questionnaire in the envelope provided and return to the researcher at your earliest convenience.

### **Example:**

If you were asked to rate "Eating breakfast" on a scale with seven places, these should be interpreted as follows:

Eating breakfast is:

<b>Good</b>	1	2	3	4	5	6	7	<b>Bad</b>
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

If you think that eating breakfast is **extremely good**, then you would circle the **number 1**.

If you think that eating breakfast is **quite good**, then you would circle the **number 2**.

If you think that eating breakfast is **slightly good**, then you would circle the **number 3**.

If you think that eating breakfast is **neither good nor bad**, then you would circle the **number 4**.

If you think that eating breakfast is **slightly bad**, then you would circle the **number 5**.

If you think that eating breakfast is **quite bad**, then you would circle the **number 6**.

If you think that eating breakfast is **extremely bad**, then you would circle the **number 7**.

1. Have you been exercising regularly during your pregnancy?

Yes/No

2. Most people who are important to me think that I should exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

3. Having a healthy lifestyle during this pregnancy is:

Undesirable 1 2 3 4 5 6 7 Desirable

4. I have adequate funds (or financial support) available which enable me to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

5. I expect to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

6. Improving my fitness during this pregnancy is:

Undesirable 1 2 3 4 5 6 7 Desirable

7. Having access to suitable facilities/groups/classes will enable me to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

8. My friends think that I should exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

9. The decision to exercise regularly during my pregnancy is under my control.

Disagree 1 2 3 4 5 6 7 Agree

10. I have adequate knowledge about exercising during pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

11. On how many days of the week do you intend to exercise during your pregnancy?

0 1 2 3 4 5 6 7

12. Exercising regularly during my pregnancy will be:

Pleasant 1 2 3 4 5 6 7 Unpleasant

13. Exercise provision in my community is suitable for pregnant women.

Disagree 1 2 3 4 5 6 7 Agree

14. Most people who are important to me want me to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

15. When it comes to my pregnancy, I want to do what exercise professionals (e.g. fitness instructors) think I should do.

Not at all 1 2 3 4 5 6 7 Very much

16. Exercising regularly during my pregnancy will prepare me for labour/delivery.

Likely 1 2 3 4 5 6 7 Unlikely

17. Exercising regularly during my pregnancy will be:

Harmful 1 2 3 4 5 6 7 Beneficial

18. I want to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

19. Managing my weight during this pregnancy is:

Undesirable 1 2 3 4 5 6 7 Desirable

20. I intend to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

21. Health professionals (e.g. midwife) think that I should exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

22. Having adequate knowledge about exercise during pregnancy will enable me to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

23. Most pregnant women will themselves exercise regularly during their pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

24. I am confident that I can exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

37. Exercising regularly during my pregnancy will be:

Foolish 1 2 3 4 5 6 7 Wise

38. Exercise professionals (e.g. fitness instructors) think that I should exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

39. Exercising regularly during my pregnancy will help me to manage my weight.

Likely 1 2 3 4 5 6 7 Unlikely

40. My psychological well-being (e.g. not feeling stressed) during this pregnancy is:

Undesirable 1 2 3 4 5 6 7 Desirable

41. When it comes to my pregnancy, I want to do what my husband/partner thinks I should do.

Not at all 1 2 3 4 5 6 7 Very much

42. Whether I exercise regularly during my pregnancy is entirely up to me.

Disagree 1 2 3 4 5 6 7 Agree

43. Exercising regularly during my pregnancy will be:

Boring 1 2 3 4 5 6 7 Exciting

44. Being better prepared me for labour/delivery is:

Undesirable 1 2 3 4 5 6 7 Desirable

45. Having adequate funds (or financial support) available will enable me to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

46. Exercising regularly during my pregnancy will contribute to a healthy lifestyle.

Likely 1 2 3 4 5 6 7 Unlikely

47. When it comes to my pregnancy, I want to do what health professionals (e.g. my midwife) think I should do.

Not at all 1 2 3 4 5 6 7 Very much

48. For me to do regular exercise during my pregnancy is:

Easy 1 2 3 4 5 6 7 Difficult



49. Most pregnant women exercise regularly during their pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

50. I have adequate access to suitable facilities/groups/classes which allows me to exercise regularly during pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

51. I feel under social pressure to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

52. My family thinks that I should exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

53. Suitable exercise provision for pregnant women in my community will enable me to exercise regularly during my pregnancy.

Disagree 1 2 3 4 5 6 7 Agree

54. So far during my pregnancy, I have exercised on \_\_\_ days of the week.

0 1 2 3 4 5 6 7

**THANK YOU!**

## **APPENDIX K**

EKE8P PILOT FEEDBACK (version 1.2)



**Participant coding number:**

**Today's Date:**

**Instructions:**

Step 1: Please familiarise yourself with the issues listed below.

Step 2: Complete the enclosed questionnaire.

Step 3: Return to this document and provide feedback about the questionnaire.

Step 4: Place and seal both documents in the envelope provided and return to the researcher before the 30<sup>th</sup> of September 2014.

**EAST KENT EXERCISE BELIEFS IN PREGNANCY QUESTIONNAIRE - FEEDBACK**

**1. How long did it take you to complete the questionnaire?**

**2. Does the questionnaire feel too long?**

**3. Is the definition of exercise clear?**

**4. Did you note any mistakes (e.g. spelling, grammar, etc.)?**

**5. Does the questionnaire feel too repetitive?**

**6. Are any items ambiguous or difficult to answer?**

**7. Does the questionnaire feel too superficial?**

**8. Are there any annoying features of the wording or formatting?**

**9. Are there inconsistent rating scales that might indicate that changes in response endpoints are problematic for respondents who complete the questionnaire quickly?**

**10. Would you like to comment on any other feature of the questionnaire?**

**11. Finally, please indicate your preference:**

I would like to receive a £5 high-street shopping voucher.

OR

I would like a £5 donation to be made to the charity Tommy's.

**THANK YOU FOR YOUR CONTINUED SUPPORT AND PARTICIPATION IN THIS STUDY!**

## APPENDIX L



### Health Research Authority

NRES Committee London - Camberwell St Giles

Level 3, Block B  
Whitefriars  
Lewins Mead  
Bristol  
BS1 2NT  
Tel: 0117 342 1391

22 December 2014

Mrs Marize De Vivo  
Researcher  
Canterbury Christ Church University  
Graduate School, Canterbury Christ Church University,  
North Holmes Road  
Canterbury  
CT1 1QU

Dear Mrs De Vivo

**Study title:** Physical activity beliefs, intentions and behaviours during pregnancy: an extension of the theory of planned behaviour.  
**REC reference:** 13/LO/1397  
**Protocol number:** N/A  
**Amendment number:** 1  
**Amendment date:** 01 December 2014  
**IRAS project ID:** 122570

The above amendment was reviewed by the Sub-Committee in correspondence.

#### Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

The Committee approved the amendments to include new supervisors, an increase in money from £5.00 to £10.00 and adjustments to questionnaires.

#### Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Non-validated questionnaire [study2a. Demographics]	2.0	11 November 2014
Non-validated questionnaire [study2a.Questionnaire.Time1.]	1.0	03 December 2014
Non-validated questionnaire [study2a.Questionnaire.Time2.]	1.0	03 December 2014
Notice of Substantial Amendment (non-CTIMP) [AmendmentForm_ReadyForSubmission (13.LO.1397)]	1	01 December 2014
Other [diagram]	2.0	02 December 2014
Participant consent form [Study2a. Consent]	3.2	03 December 2014
Participant consent form [Study2b.Consent.]	3.4	03 December 2014
Participant information sheet (PIS) [Study2a.Info.(crystal.mark.20868)]	3.2	03 December 2014
Participant information sheet (PIS) [Study2b.Info. (crystal.mark.20870)]	3.2	11 November 2014



## Health Research Authority

### Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

### R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

### Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

13/LO/1397: Please quote this number on all correspondence

Yours sincerely

**Mr John Richardson**  
Chair

E-mail: [nrescommittee.london-camberwellstgiles@nhs.net](mailto:nrescommittee.london-camberwellstgiles@nhs.net)

*Enclosures: List of names and professions of members who took part in the review*

*Copy to: Dr Art Ationu, East Kent Hospitals University NHS Foundation Trust  
Mr Roger Bone*

### NRES Committee London - Camberwell St Giles

#### Attendance at Sub-Committee of the REC meeting by correspondence

#### Committee Members:

Name	Profession	Present
Mrs Jennifer Bostock	Philosopher of Psychiatry	Yes
Ms Sally Gordon Boyd	Medical Ethicist	Yes
Mr John Richardson – Chair	Retired Director of COREC; Ecumenical Officer for Churches Together in South London	Yes

#### Also in attendance:

Name	Position (or reason for attending)
Miss Elizabeth Hearn	REC Assistant

## APPENDIX M

06/01/2015

Marlize De Vivo  
Canterbury Christ Church University  
Graduate School  
Faculty of Applied Social Sciences  
Canterbury Christ Church University  
Canterbury  
CT1 1QU

Dear Marlize De Vivo

### **Physical activity beliefs, intentions & behaviour during pregnancy**

#### **Amendment 1:**

<b>R&amp;D Ref</b>	2013/WOMHE/01
<b>REC Ref</b>	13/LO/1397

#### **Documents received**

Ethics favourable opinion letter listing all approved documents	22/12/2014
---	------------

The Amendment has been reviewed by the R&D Office and does not affect the original NHS Permission. It will be the approved amended protocol version that you must adhere to when undertaking the study.

Amendments may not be enacted until all applicable regulatory approvals are received.

It is the Sponsor's responsibility to ensure that all applicable regulatory approvals are in place before the Amendment is enacted and provide Principal Investigators with any updated documentation and applicable regulatory approvals.

The Principal Investigator is responsible for ensuring processes are in place:

- To manage the Trial Site File and update it following Amendments
- To check that any required regulatory approvals are in place
- For all members of the research team to be notified of Amendments and updated documentation as appropriate to their role in the research
- Provide relevant support departments with updated documentation as appropriate to their support for the research.

You must ensure that you are fully aware of your responsibilities and that your activities are conducted in line with the Local Research Governance Framework for Health and Social Care 2<sup>nd</sup> Edition, Research Ethics Committee conditions, The Medicines for Human Use (Clinical Trial) Regulations 2004 and Amendment Regulations 2006 and the Medicines for Healthcare Products Regulatory Agency for Clinical Trials Involving an Investigational Medicinal Product (CTIMP).

#### **Service Support Departments –**

It is the Principal Investigator's responsibility to ensure that Service Support Departments such as Radiology, Pharmacy and Pathology receive current amended versions of the study documents for



the continuing delivery of the study. Pharmacy should also receive a copy of the updated SpMC or Investigator Brochure, if supporting the trial.

**Safety Reporting**

Researchers should following the safety reporting requirements of the protocol and study sponsor, Trust R&D SOP9, - Serious Adverse Event Reporting and the Trust Policy for the Management of incidents <http://www.ekhuft.nhs.uk/staff/systems/datix-incident-reporting/>

For Studies Sponsored by EKHUFT the R&D Department should be notified as soon as practicably possible

**Monitoring**

The sponsor is responsible for ensuring studies are appropriately monitored, particularly CTIMPs. The R&D Department may conduct on-site monitoring visits on a risk-based basis.

All Principal Investigators will have access to the R&D Database – Reda - to upload study documents and study information. As a condition of Trust NHS Permission Investigators are required to use the Reda database to provide regular updates to R&D on their studies,

**End of Study Reports**

Researchers must submit End of Study reports to R&D when all study activity, including recruitment, follow-up etc, has ended.

**Training**

For all interventional studies, including CTIMPs, medical devices etc, you agree to attend Good Clinical Practice training and updates. The PI is responsible for ensuring that the research team are competent and appropriately qualified to carry out their research roles, and have received appropriate GCP training. The PI is also responsible for ensuring the research team have trial specific training, particularly in completing CRFs and reporting of SAEs.

**Delegation logs**

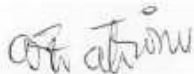
Principal Investigators are responsible for ensuring that an up to date delegation log for the study is maintained detailing the roles and responsibilities delegated to research team members

**Breach of NHS Permission conditions**

Failure to comply with these conditions or failure to provide the information when requested will result in the study being suspended and may lead to Trust NHS Permission being withdrawn

Please do not hesitate to contact the R&D Office if you require further assistance.

Yours sincerely



Dr Art Ationu (MSc, PhD, CBIOL, PG Dip, CSci, FIBMS)  
Research & Development Manager

**Conditions of Trust R&D NHS Permission**

Principal Investigators are required to meet the responsibilities listed below. Where the Chief Investigator is located at EKHUFT additional responsibilities that must also be met are listed below.

**Principal Investigator (PI)**

- To ensure the dignity, rights, safety and well being of participants are given priority at all times by the research team.
- The research is carried out in accordance with the Research Governance Framework, the Research Ethics Committee and the regulatory authority<sup>1</sup> for Clinical Trials Involving an Investigational Medicinal Product (CTIMP) and the Clinical Trial Regulations<sup>2</sup> and ensure researchers are aware of their legal duties.
- Each member of the research team is qualified by education, training and experience to discharge his/her role in the study, which is documented and held in the Trial Master File.
- Students and new researchers have adequate supervision, support and training.
- Unless urgent safety measures are necessary, the research follows the protocol approved by the Ethics Committee and the research sponsor.
- Any proposed changes or amendments to or deviations from the protocol are submitted for approval to the Ethics Committee, the research sponsor, the regulatory authority<sup>3</sup> for CTIMPs, with the exception of urgent safety measures<sup>4</sup>, and notified to the R&D Department.
- Procedures are in place to ensure collection of high quality, accurate data and the integrity and confidentiality of data during processing and storage. CTIMPs must comply with the Regulations.<sup>5</sup>
- Arrangements are made for the appropriate archiving of data<sup>6</sup> when the research has finished, and to make sure it is still accessible.
- Unless participants or the ethics opinion says otherwise, participants' care professionals are given any information directly relevant to their care that arises in the research.
- Reports on the progress and outcomes of the work required by the sponsor, funders, R&D Department, MHRA or others with a legitimate interest are produced on time and to an acceptable standard.
- The findings from the work are open to critical review through the accepted scientific and professional channels and are disseminated promptly and fed back as appropriate to participants.
- Accept a key role in detecting and preventing scientific misconduct<sup>7</sup>.
- Arrangements are in place for the management of financial and other resources provided for the study, including for the management of any intellectual property arising.
- Potential participants and other service users and carers are involved in the study design and management of the study whenever appropriate.
- The study is submitted for ethics review and does not start without a favourable ethical opinion and the research team acts on any conditions attached to the ethical opinion
- All data and documentation associated with the study are available at the request of the inspection<sup>8</sup> and auditing authorities.
- Reporting any serious adverse events, adverse drug reactions or other adverse events in accordance with EKHUFT policy<sup>9</sup>, R&D SOP<sup>10</sup> REC conditions and the legal requirements<sup>11</sup> for CTIMPs.

**Chief Investigator (CI)**

- Ensure that a suitable sponsor / co-sponsor is secured and that written agreements are in place detailing responsibilities of all parties involved in the research
- Ensure that R&D NHS Permission is in place for each care organisation participating in the study prior to the study commencing.

Where the CI or PI delegates responsibilities to members of the research team this must be clearly documented in a delegation log which is signed and dated by the relevant individuals. This should be kept in the Trial Master File (TMF) for each study. The CI remains accountable for the actions of his/her research team.

<sup>1</sup> The Medicines and Healthcare Product Regulatory Agency

<sup>2</sup> The Medicines for Human Use (Clinical Trials) Regulations [SI 2004 1031] & Amendment Regulations 2006 [SI2006 1928]

<sup>3</sup> The Medicines and Healthcare Product Regulatory Agency for acceptance of the substantial amendment

<sup>4</sup> The Medicines and Healthcare Product Regulatory Agency Serious Adverse Event Reporting Requirements

<sup>5</sup> Medicines for Human Use (Clinical Trials) Regulations 2004 and Amendment Regulations 2006 (Regulation 26)

<sup>6</sup> EKHUFT 'Case note Management Policy'

<sup>7</sup> Trust R&D Policy 'Prevention of Misconduct in Medical Research'

<sup>8</sup> Inspection and Standard Division of the Medicines and Healthcare Products Regulatory Agency

<sup>9</sup> EKHUFT 'Managing Adverse Incidents Protocol' 'Trust R&D Management Policy'

<sup>10</sup> Trust R&D SOP No.7 'Serious Adverse Event Reporting' and 'Management of R&D Policy'

<sup>11</sup> Medicines for Human Use (Clinical Trials) Regulations 2004 and Amended Regulations 2006

## APPENDIX N

Study2a.Info.December2014.Version3.2



### **PARTICIPANT INFORMATION SHEET**

#### **Validation of the East Kent Exercise Beliefs in Pregnancy Questionnaire**

You have been invited to take part in this research project because you have attended an antenatal appointment on a day that the researcher was in the clinic. You do not have to take part in this study, but before making your decision, you need to understand why the study is being carried out and what it would involve. The researcher will go through the information sheet with you and answer any questions you may have. This should take between 10 and 15 minutes. Please ask if there is anything that is unclear.

#### **About the study**

This study is designed to assess the effectiveness of a questionnaire that we have developed to investigate how pregnant women feel about exercise during pregnancy and how these feelings affect the exercise choices they make throughout their pregnancy. If you decide to take part in this study we will ask you for some background information and to fill in two sets of questionnaires. To thank you for taking part in the study, we will offer you the choice of receiving a high-street shopping voucher to the value of £10 or for us to make a £10 donation on your behalf to the charity Tommy's.

We will be asking you to fill in the East Kent Exercise Beliefs in Pregnancy Questionnaire and the Pregnancy Physical Activity Questionnaire on two separate occasions at least two weeks apart. You will be able to choose whether to fill in an electronic (online) or paper version of the questionnaire. Depending on which you choose, we will send you the questionnaire by post or by email. Approximately two weeks after we receive the first set of filled-in questionnaires, we will send you the second set of questionnaires.

To take part in this research study you must:

- be at least 18 years of age;
- have a good standard of English;
- have conceived naturally;
- have not had more than one miscarriage;
- have no previous or existing condition which might be caused or made worse by pregnancy (for example, asthma, diabetes, high blood pressure and so on); and
- have not taken part in any earlier phases of this research project.

Unfortunately, we cannot promise that the study will be of immediate benefit to you, but the details we collect may provide more specific information about the way in which exercise guidance is provided to pregnant women in the future. We will use the findings from this study to inform future studies, and they may be published in academic journals or summarised into a report for the various organisations involved.

### Your rights

It is up to you to decide whether to take part in this study. If you agree, we will then ask you to sign a consent form. You will be able to withdraw from the study at any time, without any consequences. This would not affect the standard of care you receive. If you choose to withdraw from the study, we would like to use the information you have contributed up to that point. However, if you prefer, you have the right to ask us to destroy all or part of the information you have provided.

Throughout the study, all details and personal information that we collect about you will be stored securely within Canterbury Christ Church University premises in line with the Data Protection Act (1998) and the university's own data protection requirements. Only the researcher and the people directly involved in this study will have access to the information you provide. At the end of the study, we will make all information anonymous (that is, we will remove all personal details associated with the information). This means that you will not be identified in any report or publication resulting from this study.

### About the researcher

The chief investigator in this study is Marlice De Vivo, who is a doctoral student at Canterbury Christ Church University. If at any time you have a concern or question about the nature, procedures or requirements for taking part in this study, please contact the researcher. If, however, you are still unhappy after doing this, and would like to make a formal complaint, you can do so by contacting the researcher's supervisor (see below for details).

Marlice de Vivo  
Chief Investigator  
Graduate School  
Canterbury Christ Church University  
North Holmes Road  
Canterbury  
Kent  
CT1 1QU  
Phone: 0791 481 8319  
Email: m.de-vivo319@canterbury.ac.uk

Dr Hayley Mills  
Supervisor  
Sport and Exercise Sciences  
Canterbury Christ Church University  
North Holmes Road  
Canterbury  
Kent  
CT1 1QU  
Phone: 01227 767700 (extension 3294)  
Email: hayley.mills@canterbury.ac.uk

**Thank you for taking the time to read this information sheet and congratulations on your pregnancy!**

**Please keep this document as you may want to read it again in the future.**



**APPENDIX O**

Study2a.Consent.December2014.Version3.2



**PARTICIPANT CONSENT FORM**

**Title of Project:** Validation of the East Kent Exercise Beliefs in Pregnancy Questionnaire.

**Chief Investigator:** Marlice de Vivo

**SECTION A: To be completed by the participant**

**Please read each statement carefully and initial the box:**

- 1. I confirm that I am 18 years of age or older and meet the participation criteria for this study.
- 2. I confirm that I have read and understood the information sheet dated December 2014 (version 3.2) for the above study.
- 3. I have had the opportunity to consider the information, to ask questions and have had these answered satisfactorily.
- 4. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
- 5. I agree for any data that is collected as part of this project to be used should I choose to withdraw from the study.
- 6. I agree to take part in the above study.

**Name of Participant:**

**Date:**

**Signature:**

**Address:**

**Tel:**

**Email:**

Please indicate your preferred method of participation by ticking the relevant box:

I would like to be contacted by post and prefer to complete the written questionnaire(s).

I would like to be contacted by e-mail and prefer to complete the electronic questionnaire(s).

Please indicate your preferred incentive:

Following participation, I would like to receive a high-street shopping voucher to the value of £10.

Following participation, I would like a donation to the value of £10 to be made on my behalf to the charity Tommy's.

**SECTION B: To be completed by the researcher**

**Chief Investigator:**

**Date:**

**Signature:**

**Please return one signed document and retain the other for your records.**

## APPENDIX P

Study2a.Demographics.November2014.Version2.0



**Participant coding number:**

**Today's Date:**

This questionnaire consists of three sections. Please follow the instructions for each section carefully. Remember, any information you provide will be treated as confidential and will be used solely for the purpose of this research project.

**SECTION A: SOME INFORMATION ABOUT YOU**

This section consists of eight questions. Where appropriate, please use a cross (X) to indicate your answer. Please make sure that you have answered all the questions before moving to section B.

**1. What is your age (in years)?**

--

**2. Is English your main language?**

Yes		No	
-----	--	----	--

(a) If no, what is your main language?

--

**3. What is your current marital status? Are you...?**

Single (never married or never registered a civil partnership and not living with partner)	
Cohabiting (not married or in civil partnership but living with partner)	
Married or in a civil partnership	
Separated (but still legally married or still legally in a civil partnership)	
Divorced or formerly in a civil partnership which is now legally dissolved	
Widowed or surviving partner from a civil partnership	

**4. How would you describe your national identity (i.e. belonging to a particular nation by origin, birth, or naturalization)? Please choose all that apply.**

English	
Welsh	
Scottish	
Northern Irish	
British	
Other, please describe:	



**5. What is your ethnicity? Select the option that best represents the cultural factors which define your ethnic group or background.**

<b>White:</b>	
British/English/Welsh/Scottish/Northern Irish	
Irish	
Gypsy or Irish Traveller	
Any other White background, please describe:	
<b>Mixed/Multiple ethnic groups:</b>	
White and Black Caribbean	
White and Black African	
White and Asian	
Any other Mixed/Multiple background, please describe:	
<b>Asian or Asian British:</b>	
Indian	
Pakistani	
Bangladeshi	
Chinese	
Any other Asian background, please describe:	
<b>Black/African/Caribbean or Black British:</b>	
African	
Caribbean	
Any other Black/African/Caribbean background, please describe:	
<b>Other Ethnic Background:</b>	
Arab	
Any other ethnic background, please describe:	

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

No formal qualifications	
Entry Level Certificates	
Level 1 or equivalent (e.g. GCSE's grades D-E).	
Level 2 or equivalent (e.g. GCSE's grades A-C).	
Level 3 or equivalent (e.g. A Level).	
Level 4 or C (e.g. certificates of higher education)	
Level 5 or I (e.g. diplomas of higher education, foundation degrees and higher national diplomas).	
Level 6 or H (e.g. bachelor degrees, graduate certificates and diplomas).	
Level 7 or M (e.g. masters degrees, postgraduate certificates and diplomas).	
Level 8 or D (e.g. doctorates and specialist awards).	

**7. Which of these statements best describe your employment status?**

I do not have a job at this time but I have been actively seeking work in the past four weeks and will be available to start work in the next two weeks; or I do not have a job at this time but I have found a job, and I am waiting to start it in the next two weeks.	
I do part-time/full-time paid work (as an employee or self-employed); or I had a job but I am temporarily away from it; or I am on a government-supported training and employment program; or I do unpaid family work.	
I do not have a job at this time, I have not actively sought work in the last four weeks and/or I am not available to start work in the next two weeks.	

**8. Your household income represents the total income (salaries, benefits, dividends, etc.) from all the people living in your home. These people do not have to be related. What do you estimate is your annual household income?**

**SECTION B: SOME INFORMATION ABOUT YOUR PREGNANCY**

This section consists of ten questions, some of which may not apply to you. However, please read all the questions carefully to make sure that you have not omitted any information. Where appropriate, please use a cross (X) to indicate your answer.

**9. When is your estimated due date?**

--

**10. What is the date of your last menstrual cycle (if known)?**

--

**11. How many weeks are you pregnant (if known)?**

--

**12. Are you expecting more than one baby?**

Yes		No	
-----	--	----	--

(a) If yes, how many babies are you expecting?

--

**13. Is this your first pregnancy?**

Yes		No	
-----	--	----	--

**If yes, please proceed to Section C. If no, please answer questions 14-18 before moving to Section C.**

**14. How many times have you been pregnant before?**

1	
2	
3	
More than 3	

**15. How many children do you have?**

1	
2	
3	
More than 3	

**16. How old were you when you became pregnant for the first time?**

--

**17. How many of your previous pregnancies ended in...?**

A live delivery between 37 and 41 weeks	
A premature birth (<37 weeks)	
Induced labour (>41 weeks)	
Stillbirth	
Miscarriage	
Other	

**18. Did you have any complications during a previous pregnancy?**

Yes		No	
-----	--	----	--

(b) If yes, please give details:

--

**SECTION C: SOME INFORMATION ABOUT YOUR EXERCISE PREFERENCES**

This section consists of two questions. Where appropriate, please use a cross (X) to indicate your answer. Please make sure that you answer all the questions.

**19. In the 12 months before your current pregnancy, did you participate in any physical activities on a regular basis?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

(a) If yes, please describe the main activity or activities and how often you participated (e.g. netball - 3 times per week for at least 60 minutes, running - 3 times per week for at least 30 minutes):

**20. Do you currently participate in any physical activities on a regular basis?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

(a) If yes, please describe the main activity or activities and how often you participate (e.g. yoga - 3 times per week for at least 45 minutes, walking the dog - 4 times per week for at least 15 minutes):

You have now reached the end of this questionnaire. Please make sure that you have answered all the questions that apply to you before returning the questionnaire to the researcher in the envelope provided.

Thank you!

## APPENDIX Q

Study2a.Time1.December2014.Version1.0



**Participant coding number:**

**Today's Date:**

**Estimated due date:**

This questionnaire consists of two sections.  
Please follow the instructions for each section carefully.

## SECTION A: PREGNANCY PHYSICAL ACTIVITY QUESTIONNAIRE

(adapted from Chasan-Taber, Schmidt, Roberts, Hosmer, Markenson, & Freedson, 2004)

### Instructions:

- Please use a cross (X) to indicate your answer.
- Choose only one answer for each question.
- Please answer the questions about yourself honestly.
- Remember, there are no right or wrong answers; we simply want to know about the things you are doing at this time in your pregnancy.

### Example:

Since becoming pregnant, when you are NOT at work, how much time do you usually spend:

E1. Taking care of an older adult

If you take care of your mother for 2 hours each day, then your answer should look like this...

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

### At home...

Since becoming pregnant, when you are NOT at work, how much time do you usually spend:

#### 1. Preparing meals (cook, set table, wash dishes)

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

#### 2. Dressing, bathing, feeding children while you are sitting

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**3. Dressing, bathing, feeding children while you are standing**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**4. Playing with children while you are sitting or standing**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**5. Playing with children while you are walking or running**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**6. Carrying children**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**7. Taking care of an older adult**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day



**8. Sitting and using a computer or writing - while NOT at work**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**9. Watching TV or a video/DVD**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**10. Sitting and reading, talking, or being on the phone - while NOT at work**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**11. Playing with pets**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**12. Light cleaning (make beds, laundry, iron, put things away)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**13. Shopping (for food, clothes, or other items)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**14. Heavy cleaning (vacuum, mop, sweep, wash windows)**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**15. Mowing lawn while on a riding mower**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**16. Mowing lawn using a walking mower, raking, gardening**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

### **Going places...**

**Since becoming pregnant, how much time do you usually spend:**

**17. Walking slowly to go places (such as to the bus, work, visiting) - NOT for fun or exercise**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**18. Walking quickly to go places (such as to the bus, work, visiting) - NOT for fun or exercise**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**19. Driving or riding in a car or bus**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

### **For Fun or Exercise...**

**Since becoming pregnant, how much time do you usually spend:**

**20. Walking slowly for fun or exercise**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**21. Walking more quickly for fun or exercise**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**22. Walking quickly up hills for fun or exercise**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**23. Jogging**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**24. Attending an antenatal class**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**25. Swimming**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**26. Dancing**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**Doing other things for fun or exercise? Please tell us what they are:**

**27. Name of activity:** \_\_\_\_\_

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**28. Name of activity:** \_\_\_\_\_

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**Please fill out the next section if you work for wages, as a volunteer, or if you are a student. If you are a homemaker, out of work, or unable to work, you do not need to complete this last section.**

**At work...**

**Since becoming pregnant, how much time do you usually spend:**

**29. Sitting at work or in class**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**30. Standing or walking slowly at work while carrying things (heavier than 8 pounds or 3.8 kilograms)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**31. Standing or walking slowly at work NOT carrying anything**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**32. Walking quickly at work while carrying things (heavier than 8 pounds or 3.8 kilograms)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**33. Walking quickly at work NOT carrying anything**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

## SECTION B: EAST KENT EXERCISE BELIEFS IN PREGNANCY QUESTIONNAIRE

### Instructions:

- Please answer all the questions.
- Most of the questions make use of rating scales with seven places; please circle the number that best reflects your opinion at this moment in time.
- Please note that the positive and negative ends of the scale alternate throughout the questionnaire; make sure that you select a number that is consistent with your opinion.
- Do not circle more than one number on a single scale.
- Although some questions may appear similar, they each address a somewhat different issue; please make sure that you read each question carefully.
- Remember, there are no correct or incorrect answers; we are simply interested in your personal point of view.

### Example:

If you were asked to rate "Eating breakfast" on a scale with seven places, these should be interpreted as follows:

Eating breakfast is:



Good 1 2 3 4 5 6 7 Bad  
*Extremely Good Quite Good Slightly Good Neither Good/Bad Slightly Bad Quite Bad Extremely Bad*

- If you think that eating breakfast is **extremely good**, then you would circle the number 1.  
If you think that eating breakfast is **quite good**, then you would circle the number 2.  
If you think that eating breakfast is **slightly good**, then you would circle the number 3.  
If you think that eating breakfast is **neither good nor bad**, then you would circle the number 4.  
If you think that eating breakfast is **slightly bad**, then you would circle the number 5.  
If you think that eating breakfast is **quite bad**, then you would circle the number 6.  
If you think that eating breakfast is **extremely bad**, then you would circle the number 7.

In this section we are interested in your opinion about taking part in regular moderate physical activity during your pregnancy. It is important to recognise that exercise forms part of our daily lives and can take on many forms. Sometimes we may not even realise that we are in fact exercising. For the purpose of this questionnaire regular exercise is defined as any moderate physical activity (e.g. yoga, gardening, water aerobics, housework, etc.) that requires you to expend energy whilst still being able to hold a conversation (e.g. walking briskly at a pace of 3 miles per hour) and is performed continuously for 15 to 30 minutes on at least four days of the week during your pregnancy.

**Please rate each of the following items with regards to you doing moderate physical activity for 15 to 30 minutes on at least four days of the week during your pregnancy.**

<b>1.</b> Have you been exercising regularly during your pregnancy?	Yes				No				
<b>2.</b> Most people who are important to me think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>3.</b> Having a healthy lifestyle during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>4.</b> I have adequate funds (or financial support) available which enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>5.</b> I expect to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>6.</b> Improving my fitness during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>7.</b> Having access to suitable facilities/groups/classes will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>8.</b> My friends think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>9.</b> The decision to exercise regularly during my pregnancy is under my control.	Disagree	1	2	3	4	5	6	7	Agree
<b>10.</b> I have adequate knowledge about exercising during pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>11.</b> On how many days of the week do you intend to exercise during your pregnancy?	0 1 2 3 4 5 6 7								
<b>12.</b> Exercising regularly during my pregnancy will be:	Pleasant	1	2	3	4	5	6	7	Unpleasant
<b>13.</b> Exercise provision in my community is suitable for pregnant women.	Disagree	1	2	3	4	5	6	7	Agree



<b>14.</b> Most people who are important to me want me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>15.</b> When it comes to my pregnancy, I want to do what exercise professionals (e.g. fitness instructors) think I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>16.</b> Exercising regularly during my pregnancy will prepare me for labour/delivery.	Likely	1	2	3	4	5	6	7	Unlikely
<b>17.</b> Exercising regularly during my pregnancy will be:	Harmful	1	2	3	4	5	6	7	Beneficial
<b>18.</b> I want to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>19.</b> Managing my weight during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>20.</b> I intend to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>21.</b> Health professionals (e.g. midwife) think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>22.</b> Having adequate knowledge about physical activity during pregnancy will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>23.</b> Most pregnant women will themselves exercise regularly during their pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>24.</b> I am confident that I can exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>25.</b> Exercising regularly during my pregnancy will be:	Good	1	2	3	4	5	6	7	Bad
<b>26.</b> Having more time available will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree

<b>27.</b> When it comes to my pregnancy, I want to do what my friends think I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>28.</b> Exercising regularly during my pregnancy will contribute to my psychological well-being (e.g. reduce stress).	Likely	1	2	3	4	5	6	7	Unlikely
<b>29.</b> Exercising regularly during my pregnancy will be:	Unenjoyable	1	2	3	4	5	6	7	Enjoyable
<b>30.</b> My husband/partner thinks that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>31.</b> How likely is it that you will have the time available to exercise regularly during your pregnancy?	Likely	1	2	3	4	5	6	7	Unlikely
<b>32.</b> What other pregnant women do during their pregnancy is important to me.	Not at all	1	2	3	4	5	6	7	Very much
<b>33.</b> It is expected of me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>34.</b> Exercising regularly during my pregnancy will be:	Useless	1	2	3	4	5	6	7	Useful
<b>35.</b> Exercising regularly during my pregnancy will improve my fitness.	Likely	1	2	3	4	5	6	7	Unlikely
<b>36.</b> When it comes to my pregnancy, I want to do what my family thinks I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>37.</b> Exercising regularly during my pregnancy will be:	Foolish	1	2	3	4	5	6	7	Wise
<b>38.</b> Exercise professionals (e.g. fitness instructors) think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>39.</b> Exercising regularly during my pregnancy will help me to manage my weight.	Likely	1	2	3	4	5	6	7	Unlikely

<b>40.</b> My psychological well-being (e.g. not feeling stressed) during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>41.</b> When it comes to my pregnancy, I want to do what my husband/partner thinks I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>42.</b> Whether I exercise regularly during my pregnancy is entirely up to me.	Disagree	1	2	3	4	5	6	7	Agree
<b>43.</b> Exercising regularly during my pregnancy will be:	Boring	1	2	3	4	5	6	7	Exciting
<b>44.</b> Being better prepared for labour/delivery is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>45.</b> Having adequate funds (or financial support) available will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>46.</b> Exercising regularly during my pregnancy will contribute to a healthy lifestyle.	Likely	1	2	3	4	5	6	7	Unlikely
<b>47.</b> When it comes to my pregnancy, I want to do what health professionals (e.g. my midwife) think I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>48.</b> For me to do regular exercise during my pregnancy is:	Easy	1	2	3	4	5	6	7	Difficult
<b>49.</b> Most pregnant women exercise regularly during their pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>50.</b> I have adequate access to suitable facilities/groups/classes which allows me to exercise regularly during pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>51.</b> I feel under social pressure to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>52.</b> My family thinks that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree

<b>53.</b> Suitable exercise provision for pregnant women in my community will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>54.</b> So far during my pregnancy, I have exercised on ___ days of the week.	0   1   2   3   4   5   6   7								

You have now reached the end of this questionnaire. Please make sure that you have answered all the questions that apply to you before returning the questionnaire to the researcher in the envelope provided.

Thank you!

## **APPENDIX R**

Study2a.Time2.December2014.Version1.0



**Participant coding number:**

**Today's Date:**

**Estimated due date:**

This questionnaire consists of two sections.  
Please follow the instructions for each section carefully.

## SECTION A: PREGNANCY PHYSICAL ACTIVITY QUESTIONNAIRE

(adapted from Chasan-Taber, Schmidt, Roberts, Hosmer, Markenson, & Freedson, 2004)

### Instructions:

- Please use a cross (X) to indicate your answer.
- Choose only one answer for each question.
- Please answer the questions about yourself honestly.
- Remember, there are no right or wrong answers; we simply want to know about the things you are doing at this time in your pregnancy.

### Example:

During the previous 2 weeks of your pregnancy, when you were NOT at work, how much time did you usually spend:

E1. Taking care of an older adult

If you took care of your mother for 2 hours each day, then your answer should look like this...

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

### At home...

During the previous 2 weeks of your pregnancy, when you were NOT at work, how much time did you usually spend:

#### 1. Preparing meals (cook, set table, wash dishes)

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

#### 2. Dressing, bathing, feeding children while you were sitting

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**3. Dressing, bathing, feeding children while you were standing**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**4. Playing with children while you were sitting or standing**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**5. Playing with children while you were walking or running**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**6. Carrying children**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**7. Taking care of an older adult**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**8. Sitting and using a computer or writing - while NOT at work**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**9. Watching TV or a video/DVD**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**10. Sitting and reading, talking, or being on the phone - while NOT at work**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**11. Playing with pets**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**12. Light cleaning (make beds, laundry, iron, put things away)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day



**13. Shopping (for food, clothes, or other items)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**14. Heavy cleaning (vacuum, mop, sweep, wash windows)**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**15. Mowing lawn while on a riding mower**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**16. Mowing lawn using a walking mower, raking, gardening**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

### **Going places...**

**During the previous 2 weeks of your pregnancy, how much time did you usually spend:**

**17. Walking slowly to go places (such as to the bus, work, visiting) - NOT for fun or exercise**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**18. Walking quickly to go places (such as to the bus, work, visiting) - NOT for fun or exercise**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

**19. Driving or riding in a car or bus**

- None
- Less than 1/2 hour per day
- 1/2 to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day
- 3 or more hours per day

### **For Fun or Exercise...**

**During the previous 2 weeks of your pregnancy, how much time did you usually spend:**

**20. Walking slowly for fun or exercise**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**21. Walking more quickly for fun or exercise**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**22. Walking quickly up hills for fun or exercise**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**23. Jogging**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**24. Attending an antenatal class**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**25. Swimming**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**26. Dancing**

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**Did other things for fun or exercise? Please tell us what they were:**

**27. Name of activity:** \_\_\_\_\_

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**28. Name of activity:** \_\_\_\_\_

- None
- Less than 1/2 hour per week
- 1/2 to almost 1 hour per week
- 1 to almost 2 hours per week
- 2 to almost 3 hours per week
- 3 or more hours per week

**Please fill out the next section if you work for wages, as a volunteer, or if you are a student. If you are a homemaker, out of work, or unable to work, you do not need to complete this last section.**

**At work...**

**During the previous 2 weeks of your pregnancy, how much time did you usually spend:**

**29. Sitting at work or in class**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**30. Standing or walking slowly at work while carrying things (heavier than 8 pounds or 3.8 kilograms)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**31. Standing or walking slowly at work NOT carrying anything**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**32. Walking quickly at work while carrying things (heavier than 8 pounds or 3.8 kilograms)**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**33. Walking quickly at work NOT carrying anything**

- None
- Less than 1/2 hour per day
- 1/2 to almost 2 hours per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

## SECTION B: EAST KENT EXERCISE BELIEFS IN PREGNANCY QUESTIONNAIRE

### Instructions:

- Please answer all the questions.
- Most of the questions make use of rating scales with seven places; please circle the number that best reflects your opinion at this moment in time.
- Please note that the positive and negative ends of the scale alternate throughout the questionnaire; make sure that you select a number that is consistent with your opinion.
- Do not circle more than one number on a single scale.
- Although some questions may appear similar, they each address a somewhat different issue; please make sure that you read each question carefully.
- Remember, there are no correct or incorrect answers; we are simply interested in your personal point of view.

### Example:

If you were asked to rate "Eating breakfast" on a scale with seven places, these should be interpreted as follows:

Eating breakfast is:



Good 1 2 3 4 5 6 7 Bad  
*Extremely Good Quite Good Slightly Good Neither Good/Bad Slightly Bad Quite Bad Extremely Bad*

If you think that eating breakfast is **extremely good**, then you would circle the number 1.

If you think that eating breakfast is **quite good**, then you would circle the number 2.

If you think that eating breakfast is **slightly good**, then you would circle the number 3.

If you think that eating breakfast is **neither good nor bad**, then you would circle the number 4.

If you think that eating breakfast is **slightly bad**, then you would circle the number 5.

If you think that eating breakfast is **quite bad**, then you would circle the number 6.

If you think that eating breakfast is **extremely bad**, then you would circle the number 7.

In this section we are interested in your opinion about taking part in regular moderate physical activity during your pregnancy. It is important to recognise that exercise forms part of our daily lives and can take on many forms. Sometimes we may not even realise that we are in fact exercising. For the purpose of this questionnaire regular exercise is defined as any moderate physical activity (e.g. yoga, gardening, water aerobics, housework, etc.) that requires you to expend energy whilst still being able to hold a conversation (e.g. walking briskly at a pace of 3 miles per hour) and is performed continuously for 15 to 30 minutes on at least four days of the week during your pregnancy.

**Please rate each of the following items with regards to you doing moderate physical activity for 15 to 30 minutes on at least four days of the week during your pregnancy.**

<b>1.</b> During the previous 2 weeks of my pregnancy, I have exercised regularly.	Yes				No				
<b>2.</b> Most people who are important to me think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>3.</b> Having a healthy lifestyle during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>4.</b> I have adequate funds (or financial support) available which enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>5.</b> I expect to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>6.</b> Improving my fitness during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>7.</b> Having access to suitable facilities/groups/classes will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>8.</b> My friends think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>9.</b> The decision to exercise regularly during my pregnancy is under my control.	Disagree	1	2	3	4	5	6	7	Agree
<b>10.</b> I have adequate knowledge about exercising during pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>11.</b> On how many days of the week do you intend to exercise during your pregnancy?	0 1 2 3 4 5 6 7								
<b>12.</b> Exercising regularly during my pregnancy will be:	Pleasant	1	2	3	4	5	6	7	Unpleasant
<b>13.</b> Exercise provision in my community is suitable for pregnant women.	Disagree	1	2	3	4	5	6	7	Agree

<b>14.</b> Most people who are important to me want me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>15.</b> When it comes to my pregnancy, I want to do what exercise professionals (e.g. fitness instructors) think I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>16.</b> Exercising regularly during my pregnancy will prepare me for labour/delivery.	Likely	1	2	3	4	5	6	7	Unlikely
<b>17.</b> Exercising regularly during my pregnancy will be:	Harmful	1	2	3	4	5	6	7	Beneficial
<b>18.</b> I want to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>19.</b> Managing my weight during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>20.</b> I intend to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>21.</b> Health professionals (e.g. midwife) think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>22.</b> Having adequate knowledge about physical activity during pregnancy will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>23.</b> Most pregnant women will themselves exercise regularly during their pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>24.</b> I am confident that I can exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>25.</b> Exercising regularly during my pregnancy will be:	Good	1	2	3	4	5	6	7	Bad
<b>26.</b> Having more time available will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree



<b>27.</b> When it comes to my pregnancy, I want to do what my friends think I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>28.</b> Exercising regularly during my pregnancy will contribute to my psychological well-being (e.g. reduce stress).	Likely	1	2	3	4	5	6	7	Unlikely
<b>29.</b> Exercising regularly during my pregnancy will be:	Unenjoyable	1	2	3	4	5	6	7	Enjoyable
<b>30.</b> My husband/partner thinks that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>31.</b> How likely is it that you will have the time available to exercise regularly during your pregnancy?	Likely	1	2	3	4	5	6	7	Unlikely
<b>32.</b> What other pregnant women do during their pregnancy is important to me.	Not at all	1	2	3	4	5	6	7	Very much
<b>33.</b> It is expected of me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>34.</b> Exercising regularly during my pregnancy will be:	Useless	1	2	3	4	5	6	7	Useful
<b>35.</b> Exercising regularly during my pregnancy will improve my fitness.	Likely	1	2	3	4	5	6	7	Unlikely
<b>36.</b> When it comes to my pregnancy, I want to do what my family thinks I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>37.</b> Exercising regularly during my pregnancy will be:	Foolish	1	2	3	4	5	6	7	Wise
<b>38.</b> Exercise professionals (e.g. fitness instructors) think that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>39.</b> Exercising regularly during my pregnancy will help me to manage my weight.	Likely	1	2	3	4	5	6	7	Unlikely

<b>40.</b> My psychological well-being (e.g. not feeling stressed) during this pregnancy is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>41.</b> When it comes to my pregnancy, I want to do what my husband/partner thinks I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>42.</b> Whether I exercise regularly during my pregnancy is entirely up to me.	Disagree	1	2	3	4	5	6	7	Agree
<b>43.</b> Exercising regularly during my pregnancy will be:	Boring	1	2	3	4	5	6	7	Exciting
<b>44.</b> Being better prepared for labour/delivery is:	Undesirable	1	2	3	4	5	6	7	Desirable
<b>45.</b> Having adequate funds (or financial support) available will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>46.</b> Exercising regularly during my pregnancy will contribute to a healthy lifestyle.	Likely	1	2	3	4	5	6	7	Unlikely
<b>47.</b> When it comes to my pregnancy, I want to do what health professionals (e.g. my midwife) think I should do.	Not at all	1	2	3	4	5	6	7	Very much
<b>48.</b> For me to do regular exercise during my pregnancy is:	Easy	1	2	3	4	5	6	7	Difficult
<b>49.</b> Most pregnant women exercise regularly during their pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>50.</b> I have adequate access to suitable facilities/groups/classes which allows me to exercise regularly during pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>51.</b> I feel under social pressure to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>52.</b> My family thinks that I should exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree

<b>53.</b> Suitable exercise provision for pregnant women in my community will enable me to exercise regularly during my pregnancy.	Disagree	1	2	3	4	5	6	7	Agree
<b>54.</b> During the previous 2 weeks of my pregnancy, I have exercised on ____ days of the week.	0   1   2   3   4   5   6   7								

You have now reached the end of this questionnaire. Please make sure that you have answered all the questions that apply to you before returning the questionnaire to the researcher in the envelope provided.

Thank you!

## APPENDIX S

Study2b.Info.November2014.Version3.2



### **PARTICIPANT INFORMATION SHEET**

#### **Insights into the exercise advice and guidelines given to pregnant women in East Kent: The midwife's perspective.**

You have been invited to take part in this research project because you are currently practising as a midwife within East Kent. You do not have to take part in this study, but before making your decision, you need to understand why the study is being carried out and what it would involve. Please take the time to read through and consider the information provided. If you have any further questions, please do not hesitate to ask the researcher.

#### **About the study**

This study is part of a larger study investigating how pregnant women's feelings about exercise influence their decision whether or not to take part in physical activities. We recognise that midwives play an essential role in the guidance that pregnant women receive and would like to gain insight into your experience and how you feel about providing advice in this area. If you agree to contribute to this research, we will ask you to provide some background information and to take part in an interview which we will arrange at a time and place that is convenient for both you and us.

We will record all interviews and make an exact written record of what we have discussed. After the interview, we will send you a copy of this written record and you will have the opportunity to comment on any issues you feel are relevant. To thank you for your time and contribution, we will offer you the option of receiving a high-street shopping voucher to the value of £10 or for us to make a £10 donation on your behalf to the charity Tommy's.

To take part in this research study you must:

- be at least 18 years of age;
- have a good standard of English;
- be a practising midwife; and
- have been qualified for more than one year.

Unfortunately, we cannot promise that the study will be of immediate benefit to you, but the details we collect may provide more specific information about the way in which exercise guidance is provided to pregnant women in the future. We will use the findings from this study to inform other studies, and they may be published in academic journals or summarised into a report for the various organisations involved.

#### **Your rights**

It is up to you to decide whether to take part in this study. If you agree, we will then ask you to sign a consent form. You will be able to withdraw from the study at any time, without any consequences. If you choose to withdraw from the study, we would like to use the information you

have contributed up to that point. However, if you prefer, you have the right to ask us to destroy all or part of the information you have provided.

Throughout the study, all details and personal information that we collect about you will be stored securely within Canterbury Christ Church University premises in line with the Data Protection Act (1998) and the university's own data protection requirements. Only the researcher and the people directly involved in this study will have access to the information you provide. At the end of the study, we will make all information anonymous (that is, we will remove all personal details associated with the information you have provided). This means that even though we may use direct quotations from your interview to support our findings, you will not be identified in any presentation, report or publication resulting from this study.

#### **About the researcher**

The chief investigator in this study is Marlice De Vivo, who is a doctoral student at Canterbury Christ Church University. If at any time you have a concern or question about the nature, procedures or requirements for taking part in this study, please contact the researcher. If, however, you are still unhappy after doing this, and would like to make a formal complaint, you can do so by contacting the researcher's supervisor (see below for details).

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Kent  
CT1 1QU  
Phone: 0791 481 8319  
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North Holmes Road  
Canterbury  
Kent  
CT1 1QU  
Phone: 01227 767700 (extension 3294)  
Email: hayley.mills@canterbury.ac.uk

**Thank you for taking the time to read this information sheet.**

**Please keep this document as you may want to read it again in the future.**



## APPENDIX T

Study2b.Consent.December2014.Version3.4



### **PARTICIPANT CONSENT FORM**

**Title of Project:**                    **Insights into the exercise advice and guidelines given to pregnant women in East Kent: The midwife's perspective.**

**Chief Investigator:**                **Marlize de Vivo**

### **SECTION A: To be completed by the participant**

**Please read each statement carefully and initial the box:**

1. I confirm that I am 18 years of age or older and meet the participation criteria for this study.
2. I confirm that I have read and understood the information sheet dated November 2014 (version 3.2) for the above study.
3. I have had the opportunity to consider the information, to ask questions and have had these answered satisfactorily.
4. I consent to take part in an interview and for this interview to be recorded and the contents transcribed.
5. I consent to my words being quoted anonymously in any presentation, report or publication that may result from this study.
6. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
7. I agree for any data that is collected as part of this project to be used should I choose to withdraw from the study.
8. I agree to take part in the above study.

**Name of Participant:**

**Date:**

**Signature:**

**Address:**

**Tel:**

**Email:**

Please indicate your preferred method of contact by ticking the relevant box:

I prefer to be contacted by telephone on the number indicated above.

I prefer to be contacted by e-mail on the address indicated above.

Please indicate your preferred incentive:

Following participation, I would like to receive a high-street shopping voucher to the value of £10.

Following participation, I would like a donation to the value of £10 to be made on my behalf to the charity Tommy's.

**SECTION B: To be completed by the researcher**

**Chief**

**Investigator:**

**Date:**

**Signature:**

**Please return one signed document and retain the other for your records.**

## APPENDIX U

Study2b.Demographics.July2013.Version2.0



**Participant coding number:**

**Today's Date:**

This questionnaire consists of two sections. Please follow the instructions for each section carefully. Remember, any information you provide will be treated as confidential and will be used solely for the purpose of this research project.

Page 1 of 4



**SECTION A: SOME INFORMATION ABOUT YOU**

This section consists of eight questions. Where appropriate, please use a cross (X) to indicate your answer. Please make sure that you have answered all the questions before moving to section B.

**1. What is your age (in years)?**

--

**2. Is English your main language?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
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(a) If no, what is your main language?

--

**3. What is your current marital status? Are you...?**

Single (never married or never registered a same-sex civil partnership and not living with partner)	<input type="checkbox"/>
Cohabiting (not married or in same-sex civil partnership but living with partner)	<input type="checkbox"/>
Married or in a same-sex civil partnership	<input type="checkbox"/>
Separated (but still legally married or still legally in a same-sex civil partnership)	<input type="checkbox"/>
Divorced or formerly in a same-sex civil partnership which is now legally dissolved	<input type="checkbox"/>
Widowed or surviving partner from a same-sex civil partnership	<input type="checkbox"/>

**4. Do you have any children?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
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(a) If yes, how many children do you have?

--

**5. How would you describe your national identity (i.e. belonging to a particular nation by origin, birth, or naturalization)? Please choose all that apply.**

English	<input type="checkbox"/>
Welsh	<input type="checkbox"/>
Scottish	<input type="checkbox"/>
Northern Irish	<input type="checkbox"/>
British	<input type="checkbox"/>
Other, please describe:	<input type="checkbox"/>

**6. What is your ethnicity? Select the option that best represents the cultural factors which define your ethnic group or background.**

<b>White:</b>	
• British/English/Welsh/Scottish/Northern Irish	
• Irish	
• Gypsy or Irish Traveller	
• Any other White background, please describe:	
<b>Mixed/Multiple ethnic groups:</b>	
• White and Black Caribbean	
• White and Black African	
• White and Asian	
• Any other Mixed/Multiple background, please describe:	
<b>Asian or Asian British:</b>	
• Indian	
• Pakistani	
• Bangladeshi	
• Chinese	
• Any other Asian background, please describe:	
<b>Black/African/Caribbean or Black British:</b>	
• African	
• Caribbean	
• Any other Black/African/Caribbean background, please describe:	
<b>Other Ethnic Background:</b>	
• Arab	
• Any other ethnic group, please describe:	

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

No formal qualifications	
Entry Level Certificates	
Level 1 or equivalent (e.g. GCSE's grades D-E).	
Level 2 or equivalent (e.g. GCSE's grades A-C).	
Level 3 or equivalent (e.g. A Level).	
Level 4 or C (e.g. certificates of higher education)	
Level 5 or I (e.g. diplomas of higher education, foundation degrees and higher national diplomas).	
Level 6 or H (e.g. bachelor degrees, graduate certificates and diplomas).	
Level 7 or M (e.g. masters degrees, postgraduate certificates and diplomas).	
Level 8 or D (e.g. doctorates and specialist awards).	

**8. How would you describe your employment status?**

**SECTION B:**

This section consists of three questions. Please read all the questions carefully to make sure that you have not omitted any information. Where appropriate, please use a cross (X) to indicate your answer.

**9. In which year did you qualify as a midwife?**

**10. How long have you been practicing as a midwife?**

**11. Do you hold any other qualifications?**

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

(a) If yes, please give details:

You have now reached the end of this questionnaire. Please make sure that you have answered all the questions that apply to you before returning the questionnaire to the researcher in the envelope provided. Thank you!

## APPENDIX V



### **SEMI-STRUCTURED INTERVIEW SCHEDULE**

#### **Section 1: Introductory Questions**

1. Could you begin by telling me why you wanted to be a midwife and how you got started in the profession?
2. What do you see as the main roles and responsibilities of being a midwife?
3. Can you, in a few words, sum up what you see as the main challenges of your profession but also what you particularly enjoy about it?

#### **Section 2: Exercise and Pregnancy Questions**

##### Definition of exercise:

Exercise is defined as any regular moderate physical activity that requires you to expend energy. For example, performing any one or a combination of the following activities on most days of the week: walking 2 miles in 30 minutes, gardening for 30-45 minutes, pushing a stroller 1.5 miles in 30 minutes, washing floors/windows for 45-60 minutes, swimming for 20 minutes, dancing for 30 minutes, running 1.5 miles in 15 minutes, etc.

1. We asked pregnant women what they thought the main advantages and disadvantages of exercise during pregnancy were. What do you think they said and what would you have said these were from a midwife's perspective?
2. Do you think that pregnant women receive adequate information regarding exercise during pregnancy?
3. What is your opinion regarding physical activity during pregnancy? How important do you think it is in the grand scheme of things?
4. How confident do you feel providing advice about exercise during pregnancy?
5. Do you feel that your training has adequately prepared you for providing exercise advice?
6. How do you personally feel about physical activity and do you think that this has in any way influenced your professional practise?
7. Have you ever encountered a particularly challenging question or situation with regards to exercise during pregnancy?
8. I'm going to read you an extract from a published article and I would be interested in your thoughts.

“One of the most important issues arising from this study was the perceived lack of accessible information and advice on the benefits of physical activity during pregnancy. Midwives were viewed as being ideally placed to advise and support women about physical activity in pregnancy. However, many of the study participants described how their midwives had not given them any advice or guidance on physical activity. It has also been suggested from the findings of previous research that healthcare providers are often reluctant to advise on diet and activity changes during pregnancy” (Weir et al., 2010, p. 6).

Do you agree with this? Would you say that this is a fair reflection of current practise?

9. What are the most significant barriers to you promoting an active pregnancy?
10. When it comes to giving advice about exercise during pregnancy, which resources can you draw on or make use of (e.g. have you referred pregnant women to any online resources)? Is there a reason for choosing these resources?
11. How do you keep up-to-date about the information that is available for pregnant women?
12. Do you think that more should be done to raise awareness about the guidelines for exercise during and after pregnancy? If so, what suggestions do you have and where do you think the focus should be e.g. birth outcomes, benefits for mum, benefits for baby, etc.?
13. Do you think that more should be done to provide opportunities for pregnant women to be active? For example:
  - Do you think that pregnant women should have access to supervised training facilities and/or opportunities?
  - Do you think that pregnant women should have access to free training facilities and/or opportunities?
  - Do you think that pregnant women should be incentivised to adopt a more active pregnancy?

### **Section 3: Concluding Questions**

With regards to exercise during pregnancy, are there any additional issues that we've not talked about, that you think would be important to address?

**Interview Prompts/Probes:**

- You haven't mentioned X...
- You've said/mentioned Y...
- What do you mean by Z?
- Would you elaborate on that?
- Could you say some more about that?
- That's helpful. I'd appreciate if you could give me more detail.
- I'm beginning to see the picture but some more examples might help.
- What you're saying now is very important, and I want to make sure that I understand exactly what you mean by it, please explain some more.