

Keeping the balance: promoting physical activity and healthy dietary behaviour in pregnancy

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SUMMARY (ABSTRACT)

Gaining large amounts of weight during pregnancy may contribute to development of obesity and is associated with poor outcomes. Therefore managing gestational weight gain is important to reduce the risk of complications. This thesis aims to explore clinical and personal management of gestational weight gain and to discover how pregnant women can be best supported to maintain physical activity and healthy dietary behaviours. This is achieved through a programme of research comprising three related studies.

Study One explored the antenatal clinical management of weight and weight gain through one-to-one interviews with Antenatal Clinical Midwifery Managers across Wales ($n=11$). Findings showed wide variation in management of weight from unit to unit. Although midwives believed pregnancy to be a perfect opportunity to encourage healthier behaviours, many identified barriers preventing them discussing weight with women.

In Study Two semi-structured interviews with pregnant women ($n=15$) investigated views on personal weight management during pregnancy. Again pregnancy was seen as an ideal time to improve health behaviours due to a perceived increase in motivation and many women identified specific goals. However, in the face of various barriers, it was apparent that the motivation which initially identified healthy lifestyle goals was unable to sustain this behaviour throughout the pregnancy.

Finally Study Three looked at the feasibility and acceptability of a midwife-led intervention informed by the two preliminary studies. The 'Eat Well Keep Active' intervention programme designed to promote healthy eating and physical activity in pregnant women ($n=20$) was based upon the Self Determination Theory framework for enhancing and maintaining motivation and utilised motivational interviewing. Results indicated that the intervention was received well by participants who reported that it positively influenced their health behaviours. The 'Eat Well Keep Active' programme may be a suitable intervention to encourage and facilitate women to pursue a healthier lifestyle throughout their pregnancy.

DECLARATIONS AND STATEMENTS

DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged with explicit references, and a full reference list is appended.

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STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

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ABBREVIATIONS

| | |
|---------------|--|
| ALSPAC | Avon Longitudinal Study of Parents and Children |
| AN | Antenatal |
| ANC | Antenatal clinic |
| BMI | Body mass index |
| CEMACH | Confidential Enquiry into Maternal and Child Health |
| CMACE | Centre for Maternal and Child Enquiries |
| CO | Carbon monoxide |
| COI | Central Office of Information |
| CYPRN | Children and Young Peoples Research Network |
| DEFRA | Department for Environment, Food and Rural Affairs |
| DOH | Department of Health |
| ED | Energy dense |
| EGWG | Excessive gestational weight gain |
| EWKA | Eat Well Keep Active |
| FSA | Food Standards Agency |
| GP | General Practitioner |
| GTT | Glucose tolerance test |
| GWG | Gestational weight gain |
| HBM | Health Belief Model |
| HCCQ | Health Care Climate Questionnaire |
| HCP | Health care professional |
| HC-SDT | Health Care Self Determination Theory questionnaire pack |
| HELP | Healthy Eating and Lifestyle in Pregnancy |
| HR | Heart rate |
| HSE | Health Survey England |
| IOM | Institute of Medicine |
| IRAS | Integrated Research Application System |
| LHB | Local Health Board |
| LREC | Local research ethics committee |
| LSCS | Lower segment caesarean section |
| MET | Metabolic equivalent of task |
| MI | Motivational Interviewing |
| MINT | Motivational Interviewing Network of Trainers |
| MITI | Motivational Interviewing Treatment Integrity |
| MRC | Medical Research Council |
| NHS | National Health Service |
| NICE | National Institute for Health and Clinical Excellence |
| NISCHR | National Institute for Social Care and Health Research |
| NMC | Nursing and Midwifery Council |
| NRT | Nicotine replacement therapy |
| NVB | Normal vaginal birth |
| NVP | Nausea and vomiting in pregnancy |
| ONS | Office for National Statistics |
| PA | Physical activity |
| PCS | Perceived Competence Scale |
| PFFQ | Pregnancy Food Frequency Questionnaire |

| | |
|-----------------|---|
| PIS | Participant information sheet |
| PN | Postnatal |
| PNSS | Pregnancy Nutrition Surveillance System |
| PPAQ | Pregnancy Physical Activity Questionnaire |
| PRAMS | Pregnancy Risk Assessment Monitoring System |
| PROM | Preterm rupture of membranes |
| PST – pc | Problem Solving Training for primary care |
| R&D | Research and Development |
| RCBC | Research Capacity Building (Wales) |
| RCM | Royal College of Midwives |
| RCOG | Royal College of Obstetricians and Gynaecologists |
| SD | Standard deviation |
| SDT | Self Determination Theory |
| SGA | Small for gestational age |
| SLT | Social Learning Theory |
| SOC | Stages of Change |
| TPB | Theory of Planned Behaviour |
| TSRQ | Treatment Self Regulation Questionnaire |
| TTM | Transtheoretical Model |
| UK | United Kingdom |
| UKWF | United Kingdom Weighing Federation |
| USS | Ultrasound scan |
| WAG | Welsh Assembly Government |
| WHO | World Health Organisation |
| WHR | Waist to hip ratio |

CHAPTER 1.

INTRODUCTION:

There is mounting evidence suggesting that the health of a country's population can be greatly improved through changing health-related behaviour. An unhealthy lifestyle resulting from a poor diet and lack of physical exercise is recognised as the leading cause of obesity and overweight and is the main contributor to non-communicable diseases such as cardiovascular disease, type 2 diabetes and some forms of cancer. With non-communicable diseases accounting for more than 60% of deaths globally and 88% of deaths in the United Kingdom (WHO, 2011), it is clear to see why tackling obesity through behaviour change is considered a health priority of the UK government.

In the last 25 years obesity rates within Britain have more than tripled (DOH, 2012) leading to politicians, health organisations and the media announcing that the UK is in the grip of an "obesity epidemic" (Donaldson, 2008, Butland et al., 2007, Watt, 2008). This rise in prevalence is affecting all age groups including women of reproductive age. In childbearing, overweight and obesity are associated with an increased risk of maternal, birth and neonatal complications (Bhattacharya et al., 2007, Lewis, 2007), and excessive weight gain in pregnancy is understood to further increase these risks and predispose women to long-term obesity (Cedergren, 2006, Jensen et al., 2005). Excessive gestational weight gain has also been reported as being associated with early termination of breast feeding (Hilson et al., 2005), breast cancer (Kinnunen et al., 2004) and childhood obesity (Oken et al., 2007, Olson et al., 2008), and therefore not only impacts on women's health but can also impact on the health of future generations.

As a result of the mounting evidence regarding maternal lifestyle behaviours and their contribution to obesity, the National Institute for Health and Clinical Excellence (NICE) has repeatedly identified pregnancy as a key time in a woman's life in which to target obesity prevention (NICE, 2011, NICE, 2006, NICE, 2007). In Wales, a government strategy regarding maternity services has highlighted the public health role of the midwife in promoting healthy lifestyle behaviours (Welsh Government, 2011b). So it would appear that pregnancy should be viewed as a perfect opportunity for focusing interventions to improve the health of women and their offspring through maternal behaviour change.

This thesis contributes to the body of knowledge in this area by conducting a programme of research consisting of three related research studies. The overall purpose of the research programme is to explore both the clinical and personal management of gestational weight gain, in order to find out how best to support women to maintain healthy dietary and physical activity behaviour during pregnancy.

Thesis structure

This chapter reviews the relevant literature. Firstly the topic of obesity within the general population is explored before focussing on the literature around weight in childbearing. Recommendations regarding gestational weight gain are also examined. Then a detailed critical review of intervention studies designed to limit gestational weight gain through behaviour change is provided and this sets the context for the research carried out. This chapter then provides an overview of some of the most commonly used psychological theories of health behaviour change in order to explain the theoretical underpinning of many intervention studies. Key concepts such as motivation, self-efficacy and self-regulation are reviewed, prior to focusing on four of the most widely used theories/models: Health Belief Model, Social Learning Theory, Theory of Planned Behaviour, and lastly the Transtheoretical Model of Behaviour Change. This chapter concludes with an introduction and overview of the research schema. It sets out the aims and objectives of each of the three separate but related studies: the scoping study, the longitudinal study and lastly the intervention study.

Chapter 2 contains details of study one, the scoping study. This is a qualitative study using one to one interviews with Antenatal Clinic Managers from across Wales to provide an overview of the service provision and antenatal management of gestational weight and weight gain in Wales. The design of this study will be described and justified and study findings will be discussed in relation to the literature.

Chapter 3 will describe study two; a qualitative study of pregnant women's views of gestational weight gain exploring their dietary and physical activity intentions for pregnancy. This is a longitudinal study which captures the views of women early in pregnancy and then follows them after the birth of their baby. Here again the design of the study will be described and justified and the study findings will be discussed.

Chapter 4 discusses Self Determination Theory (SDT); a theory of human motivation and the counselling technique of Motivational Interviewing (MI) both models are integrated to form the theoretical and operational framework respectively for the final intervention study.

Chapter 5 will detail the methods used for the third and final study. This final study piloted an intervention to promote healthy eating and physical activity behaviours during pregnancy. The development of the intervention was informed by the literature and also the findings of the two preliminary studies. The content and delivery of the intervention programme will be discussed. This final study aims to assess the feasibility and acceptability of the intervention to women and will do this through a mixed methods approach utilising questionnaires and interviews. The results of the intervention study are presented, and these results are discussed in relation to the published evidence.

Finally, Chapter 6 is the synoptic discussion which draws together the common findings and limitations from each of the three separate studies and forms the conclusion of the thesis. Implications for future research, education and clinical practice are discussed.

1. 1. Literature review

This chapter will review the evidence available regarding lifestyle behaviours. It will not cover all aspects of health behaviours such as smoking, alcohol/substance misuse and sexual behaviours, rather it will focus on the two specific areas closely associated with obesity and weight, namely that of diet and physical activity. It will do this through reviewing and appraising the literature. Essentially it seeks to acknowledge and consolidate the key areas and provide empirical evidence within the context of an informed, current debate. Relevant literature was identified through searches of databases including ASSIA, BioMed Central, CINAHL, OVID, PubMed, and Wiley, using key terms which included: pregnancy, weight, gestational weight gain, dietary & physical activity behaviours. Further information on the search strategies used for the different aspects of the literature review can be found in Appendix 1. This review includes a combination of research articles, policy documents and guidelines. This chapter is structured so that initially the area of obesity and its effect on health within the non-pregnant population will be reviewed; specifically definitions and causes will be looked at alongside the political debate to provide a background and place the topic into context. Then research and current clinical practice regarding obesity and weight gain in childbearing will be reviewed as well as the evidence relating to eating and activity behaviours of pregnant women. The chapter will then focus on a detailed critical review of the published interventions designed to improve eating and physical activity behaviours in pregnancy and gaps in the evidence will be identified. Finally an overview of the most commonly used psychological theories and models of behaviour change will be discussed.

1. 1. 1 Obesity & weight gain in the non-pregnant population

1. 1. 1. 1 Defining overweight and obesity

When body fat exceeds what is widely considered to be healthy for an individual they are referred to as being either overweight or obese, the latter being used to describe the higher end of the weight spectrum when weight has accumulated to such an extent as to negatively impact on

health (WHO, 2000). It is the impact on health that has led obesity to be recognised in the medical field as a pathological condition. Indeed, obesity is a known contributing factor to many prevalent chronic conditions such as diabetes, cardiovascular disease, stroke, respiratory and muscular skeletal problems (NICE, 2006). Individuals with high levels of visceral fat, known as central obesity, are at a greater risk of developing these health complications than those with peripheral fat distribution (Arner, 1997). Obesity can also impact on the psychosocial welfare of individuals, as social discrimination and prejudice is widespread (Puhl et al., 2008). This stigmatisation can lead to depression and low self-esteem which is associated with unhealthy behaviour such as maladaptive eating behaviour and avoidance of exercise, further confounding the situation (Puhl and Heuer, 2009). Due to its negative impact on health, obesity has been described as the single most important health challenge to face our society (DOH, 2009d).

There are a number of tools used to define and classify obesity with the purpose of identifying those individuals at greatest risk of developing health complications. Body Mass Index (BMI) is the most widely accepted and used of these tools (Duggleby et al., 2009). BMI is derived from a simple calculation using metric measurements of weight divided by squared height. The World Health Organisation (WHO) promotes the use of BMI to classify weight into categories: underweight, healthy weight, overweight and obese (see Table 1). This categorisation of weight, it reports, is valuable for a number of reasons including the assessment of patients and patient groups as well as for surveillance (WHO, 2000).

Table 1 Classification of adult weight by Body Mass Index (BMI)

| BMI | Category | Health risk |
|-------------|-----------------|--|
| < 18.5 | Underweight | Low (associated with different health risks) |
| 18.5 – 24.9 | Ideal Weight | Average |
| 25 – 29.9 | Overweight | Increased |
| 30 – 34.9 | Obese class I | Moderate |
| 35 – 39.9 | Obese class II | Severe |
| >39.9 | Obese class III | Very severe |

Adapted from WHO 2000

Measuring BMI is relatively inexpensive as it requires minimal equipment. However, as a tool for the measurement of obesity, BMI is not without its limitations, specifically because it does not differentiate between fat and muscle and therefore does not measure fat mass. In athletes, BMI overestimates levels of obesity and in individuals with low muscle density, such as the elderly, it underestimates levels of obesity (WHO, 1995). It has also been argued that BMI may be an inaccurate measure of obesity in different ethnic groups due to the difference in body proportions (Deurenberg et al., 1999). Indeed there has been some debate regarding the altering of cut-off points for the Asian population due to the increase in body fat percentage found at differing BMI categories in comparison to typical western populations (Razak et al., 2007). Two other tools frequently used for classifying and identifying obesity are waist circumference measurements and waist to hip ratio (WHR); unlike BMI both provide information about body fat distribution. Waist circumference has been found to be more accurate than BMI alone as a measure of elevated health risk (Lean, 1995), and WHR has recently been identified as a particularly accurate tool for gauging obesity in elderly populations (Srikanthan et al., 2009).

The World Health Organisation expert consultation (WHO, 2004) reviewed the evidence regarding the different associations between BMI and body fat percentage of Asian populations and published their findings. This publication recognised that many individuals with elevated health risks fell into categories below that of overweight, although they found that there was no evidence of clear cut-off points for all Asian groups and therefore decided that redefining of BMI for the Asian population was not appropriate. However they did recommend that measurement of waist circumference should be used in conjunction with BMI to identify individuals at greatest risk of developing health complications in those countries with high incidence of central obesity.

It is evident that, despite the limitations associated with it, Body Mass Index continues to be the primary tool used by health professionals to identify and categorise obesity, indeed BMI has been referred to as the 'gold-standard' for diagnosing obesity in adults (NICE, 2006).

1. 1. 1. 2 Causes of overweight and obesity

Overweight and obesity are the result of weight gain where energy intake exceeds energy expenditure. The rate at which intake exceeds expenditure dictates the amount of weight gained. It follows also that if energy expenditure exceeds energy intake weight loss ensues. In order to maintain weight therefore, a balance between energy expenditure and energy intake must be achieved (Woodward-Lopez et al., 2006). This is a rather simplistic view of what is recognised as a complex condition. There is now a general acceptance amongst health professionals and policy makers alike that it is a combination of a biological susceptibility and societal changes to lifestyle that are the primary reasons for the high levels of obesity found in the UK population (Butland et al., 2007). Obesity is thought to be partly attributable to genetics, and some studies looking at familial inheritance have suggested that there may be between a 20-40% link (Bouchard, 1997), although it is understood that in most cases the link is to susceptibility to gain weight, rather than to obesity per se (Maffeis, 2000). The recent rise in rates of obesity however, cannot be solely attributable to genetics as significant genetic alteration would take a longer period of time to reflect in the population (Swanton and Frost, 2007). Rather it is the changes to lifestyle which are thought to be the primary cause. It is recognised that daily energy expenditure has declined drastically with the widespread use of labour saving devices, escalating car usage, reduced work-related physical activity and increased amounts of leisure time spent in sedentary activities such as watching television and computer use (Hill and Melanson, 1999, Davies et al., 2007). These changes in energy expenditure have not been matched by a decline in energy intake. In the last three decades consumption of energy dense food-stuff has not decreased but in fact increased (Swinburn et al., 2009). Food is regularly consumed “on the go” and eating outside of the home environment is common (DEFRA, 2009), these convenience foods are often highly processed and calorie laden, adding to the over consumption of energy and therefore weight gain. Increasing portion size has also been implicated in the rise in rates of obesity (Ello-Martin et al., 2005, Young and Nestle, 2002). The evidence regarding causes of rise in rates of obesity points to a complex combination of genetic susceptibility to gain weight with environmental changes, including alterations to a lifestyle that promotes a decrease in physical activity and an increase in consumption (Butland et al., 2007).

1. 1. 1. 3 The political arena

Obesity and overweight are not just medical issues. In recent years, due to the increase in prevalence, the topic of obesity has entered the political arena. The World Health Organisation formally identified that rates of obesity were rising at such an alarming rate it should be considered to be an epidemic (WHO, 1997), a term more commonly used in connection with infectious diseases:

“Epidemic - A widespread occurrence of an infectious disease in a community at a particular time.” (Oxford University Press, 2010)

Therefore in using this term to describe the rising rates of obesity, it would appear to give the impression that obesity in itself is a disease, rather than a risk factor for disease and this view has been criticised (Campos et al., 2006, Gard and Wright, 2005). However, the term ‘obesity epidemic’ has been widely used by politicians and the media alike (Lichtarowicz, 2004, Donnelly, 2009, Donaldson, 2008), which may be due, in part, to the term’s ability to capture the attention of the public and to make the headlines.

It is worth noting that with the increase in the public focus on obesity and the co-morbidities associated with it, some have voiced a counter argument to the claim that adiposity causes disease. Campos and colleagues (2006) argue that rather than obesity causing individuals to be more susceptible to developing metabolic syndrome (and thus diabetes and cardiovascular disease), that in fact the converse may be true. Increasing weight gain may be an early symptom of metabolic syndrome and not, as is commonly believed the underlying cause (Campos et al., 2006). They argue that the current rhetoric which identifies obesity as the catalyst for a public health crisis is not due to the risk it poses to health but rather it is driven by the cultural and political factors. Campos in his book ‘The Obesity Myth’ purports that the risks associated with obesity have been greatly exaggerated leading to a ‘moral panic’ around weight, whilst greater risks to health such as those posed by poverty, poor nutrition and a society that supports a sedentary lifestyle have been widely ignored (Campos, 2004).

In the United Kingdom being overweight is now the norm, with the majority of the population falling into this category. The Health Survey for England (HSE) has shown that rates of obesity have consistently increased since 1993 and the most recent report shows nearly 58% of women were overweight of whom 26% were identified as obese (HSE, 2011). In Wales the most recent statistics identify similar results where 57% of the population were classified as overweight or obese with a BMI exceeding 25 (Welsh Government, 2010b). However, unlike the HSE, where

measurements of height and weight were taken by trained professionals, this data were acquired through self-reporting and it is widely acknowledged that self-reporting results in an under-reporting of weight and over reporting of height (Roberts, 1995), so the actual percentage of the population with a raised BMI may be higher. The upward trend in obesity in the UK, because of the recognised co-morbidities has placed a significant and increasing burden on the National Health Service, estimated to be £4.2 billion in 2007. This is predicted to rise to £9.7 billion by 2050 (McPherson et al., 2007).

In response to the rise in prevalence, the Labour government's Foresight programme commissioned a project aimed at a long-term approach to tackling the problem of obesity (Butland et al., 2007). The subsequent report predicted that if current trends continue, by 2025 40% of the population could be classified as obese. By 2050 Britain could be predominantly obese, with women in the healthy weight category dropping from 40% to 10%. The Foresight Report recognised that Britain has become an obesogenic environment, i.e. the way in which the society functions cause its population to become obese. The report therefore made recommendations for a system-wide long-term approach for sustainable living that moves away from individual responsibility towards policy making aimed at prevention. This move is in stark contrast to the health policy for chronic conditions management which now places an emphasis on individual responsibility for self-care and self-management (Welsh Government., 2008, DOH, 2004b). The Foresight Report made clear associations between the rising rates of obesity and increasing carbon emissions leading to climate change. The authors recommended collaboration with other on-going policy goals such as tackling health inequalities and climate change, where such goals can reduce levels of obesity indirectly. For example encouraging cycling and walking improves carbon emissions whilst increasing individual energy expenditure thus impacting on levels of obesity. Similarly reducing health inequalities through promotion of healthy diets and lifestyle will also impact on rates of obesity.

Following publication of the Foresight report, the Department of Health produced 'Healthy Weight Healthy Lives' (DOH, 2008) a cross government strategy with the ambitious goal of halting and reversing the trend in obesity and initially the focus will be on improving the health of children. Part of this strategy has been an initiative called 'Change4Life', targeting families to change health behaviours through the use of advertising to encourage healthy eating (such as the five-a-day programme) and increasing levels of activity (DOH, 2009a). This has the aim of counterbalancing the advertising campaigns of the commercial sector which spend approximately £335 million a year on adverts for confectionary, fast foods and soft drinks. Although the Department of Health had only £75 million to spend on this project, funding in the order

of £200 million pounds had been obtained from commercial companies to support the Change4Life campaign. It is this element that has caused some controversy as the commercial companies involved include supermarkets such as Asda and Tesco as well as companies including PepsiCo and Kellogg's. An editorial in the Lancet accused the government of making ill-judged partnerships with companies that, they argue, were contributing to the obesity epidemic through the selling of unhealthy foodstuffs (The Lancet, 2009). However, the Labour government defended the sponsorship as it recognised that social marketing principles combined with the ability of some commercial brands to influence behaviour can be a useful tool in the reduction of obesity rates (Devlin, 2009). It should also be noted that any national company involved in the project as a partner is required to abide to a strict terms of engagement which ensures that companies commit to working with the Change4Life initiative to encourage both dietary and physical exercise changes (DOH, 2009a).

Other initiatives resulting from the 'Healthy Weight Healthy Lives' strategy include the launch of 'Start4Life' (an advertising campaign aimed at pregnant women and parents of babies to help support the establishment of healthy feeding practices starting with increasing the initiation and maintenance of breast feeding), as well as advising on weaning; a 'Healthy Schools Programme' as well as a 'Play Strategy' to encourage children to become active through the provision of free, safe and enticing environments to play in (DOH, 2009b, DOH, 2009e).

The Department of Health also commissioned NICE to develop public health guidance aimed at preventing obesity and maintenance of a healthy weight (NICE, 2010b). The scope for the guidance is clear in recognising that any programme should have a multi-faceted approach incorporating governmental strategies, both centrally and locally as well as community, industry, and society as a whole and as such reflects the Foresight report view.

Thus it can be seen that successive UK governments have moved away from the concept that reducing obesity is solely the responsibility of the individual concerned, towards a societal response to tackle the obesogenic environment.

This too has been reflected in Welsh Government strategic policy. The 'Our Healthy Future 2010-2020' (Welsh Government, 2009) sets the agenda for public health in Wales up to the year 2020 and highlights the need to improve diet and physical activity behaviours across the life course. It clearly sets out the need for action not just on an individual basis but is a partnership between Government, Local Health Boards, schools industry and the wider society in order to tackle the health of the Welsh Population. This publication has led to the development of the

All Wales Obesity Pathway (Welsh Government, 2010a). The pathway is a tool to assist LHB's, local authorities and key stakeholders to tackle obesity using a collaborative approach to inform local policy, services and activity for children and adults across Wales in the development of obesity management and prevention. This pathway makes explicit reference to the need to target programmes at those at greatest risk of excessive weight gain and identifies pregnancy as being a key time in the development of obesity.

1. 1. 2 Obesity in childbearing

There is strong evidence to suggest that a raised BMI is associated with increased risk of pregnancy complications such as hypertension, pre-eclampsia, diabetes, thromboembolic disorders, assisted and operative delivery (Hrazdilova et al., 2001, Lewis, 2007). Maternal obesity in pregnancy also increases the risks to fetal and neonatal health such as miscarriage, macrosomia, congenital anomalies, hypoglycaemia, admission to neonatal intensive care, and stillbirth (Dixit and Girling, 2008, Krishnamoorthy et al., 2006, Gilboa et al., 2010). Many of the fetal and neonatal health implications are as a direct result of the pregnancy and labour complications experienced by their mothers with the possible exception of congenital anomalies. The cause of the observed association between maternal obesity and congenital anomalies is not well understood. Although it is recognised that neural tube defects are linked to levels of maternal folate, the mechanisms involved with the link between maternal obesity and congenital heart defects is less clear (Rasmussen and Galuska, 2010).

Research has also found that children born to obese mothers are more susceptible to obesity in adolescence and adulthood (Whitaker, 2004, Godfrey and Barker, 2000). There is some debate as to why obese women are more likely to have obese children. It may be due to genetic susceptibility, environmental factors or to learned dietary behaviours (Loos and Bouchard, 2003). However, there is research to suggest that maternal diet during pregnancy can influence offspring dietary habits and risk of obesity. Experimental animal studies have found that rats fed on an energy dense diet as opposed to a balanced diet during pregnancy, produce offspring with a greater preference for junk food and a greater propensity for obesity (Bayol et al., 2007). This suggests that the quality of food eaten in pregnancy may in some way pre-programme offspring to over-consume. On this basis women should be encouraged to have a healthy balanced diet in pregnancy, not just to improve their own health and provide the best start for the baby, but also as a wider preventative strategy to reduce obesity in children.

As with the non-pregnant population, the prevalence of obesity during pregnancy is rising and although lower than the national prevalence it is estimated to be between 16% and 19% (Kanagalingam et al., 2005, Heselhurst et al., 2007)

The seventh Confidential Enquiry into Maternal and Child Health report into maternal deaths in the UK (Lewis, 2007), found that women with a raised BMI (BMI >30) were at increased risk of maternal mortality. Indeed of the reported maternal deaths, 27% were classified as obese, of which 8% had a BMI exceeding 40. For 21% of the maternal deaths BMI was not available. It was identified that there was a lack of consistency in the services for obese pregnant women due to an absence of evidence based clinical guidelines. In response, the Centre for Maternal and Child Enquiries conducted a national study to look at the maternity service provision for women identified as being obese and as a result produced a joint guideline with the Royal College of Obstetricians and Gynaecologists for the care of obese women in pregnancy which included a set of auditable standards (CMACE/RCOG, 2010). Specifically the guideline addresses women in all obese categories (classes I, II & III) with additional care recommended for each category to reflect increased risk of further complications with increasing BMI. It does not provide recommendations for women who are not classed as obese when first booking for maternity care despite the fact that individuals who are in overweight categories are understood to be more likely to gain high amounts of gestational weight (Chu et al., 2009) which may then classify them as obese later in the course of their pregnancy. Thus this group of women with borderline obesity may not receive appropriate care. As with the 2007 report, the most recent confidential enquiry noted that women with obesity continued to be at greater risk of maternal mortality with 31% of the maternal deaths for who BMI was recorded identified as having a BMI of 30 or above (CMACE, 2011). Improvements were found in the recording of BMI of women in the intervening years between the two reports, although until the next report, it will not be possible to establish whether the CMACE/RCOG guideline for the care of obese pregnant women will reduce the number of maternal deaths.

Not only does having a BMI at the upper end of the spectrum increase risk of complications, but women with a lower BMI are also considered to be high risk. Having a low BMI (<18.5) is known to increase the incidence of pregnancy and neonatal problems most commonly pre-term birth and having a baby of low birth weight (Ronnberg et al., 2003).

1. 1. 3 Weight gain in pregnancy

Although gestational weight gain varies considerably, it has been suggested that typically pregnancy should result in a weight gain at term of approximately 11 kilos (25 lbs) (Tse and Macones, 2009); this gain is made up of products of conception such as the fetus and placenta, as well as physiological changes to support the growing fetus.

This distribution of weight gain at term can be seen in Table 2 (below). The North American literature regarding weight gain is of the view that excessive weight gained in pregnancy is primarily the result of excess fat stores (Tse and Macones, 2009), although this is not a universally held belief.

Table 2 Typical components of pregnancy weight gained at term

| Constituents | Weight range -Kilos | Weight range - lbs |
|------------------------|---------------------|--------------------|
| Fetus | 3.2-3.6 | 7-8 |
| Placenta | 0.7 | 1.5 |
| Amniotic Fluid | 0.9 | 2 |
| Fat stores | 2.7-3.6 | 6-8 |
| Increased blood volume | 1.3-1.8 | 3-4 |
| Increase fluid volume | 0.9-1.3 | 2-3 |
| Breast engorgement | 0.9-1.3 | 1-3 |
| Uterine hypertrophy | 0.9 | 2 |

Adapted from (Tse and Macones, 2009)

There is increasing evidence to suggest that excessive weight gain in pregnancy may further increase the risks of adverse outcomes, similar to those associated with obesity. Rates of pre-eclampsia, hypertension, gestational diabetes, assisted and operative deliveries are all increased in those women who gain excess weight (Cedergren, 2006, Jensen et al., 2005, Kabiru and Raynor, 2004). Neonatal complications associated with maternal excessive weight gain include macrosomia, hypoglycaemia and hyperbilirubinemia (Hedderson et al., 2006). It is also understood

that women identified as gaining excessive weight in pregnancy are more likely to experience long-term obesity (Linne, 2004, Rooney and Schauburger, 2002) as are their offspring (Oken et al., 2007, Oken et al., 2008). Therefore maternal gestational weight gain may influence the rates and extent of obesity for future generations, and as such could be considered as an ideal opportunity to address the issue of obesity.

In North America and parts of Europe guidelines for weight gain during pregnancy based on pre-pregnancy BMI are in use. These were first developed in 1990 by the Institute of Medicine (IOM), and were subsequently updated (IOM, 2009). These guidelines resulted from observational data demonstrating that women who gained within these ranges consistently experienced better pregnancy outcomes. The IOM recommend that by the end of the first trimester (12 weeks gestation), weight gain should be between 0.5 – 2kg and are specific about weekly weight gains thereafter (see Table 3). The original report (IOM, 1990) recommended that black and adolescent women should aim to gain at the upper limit for their weight category. This was based on evidence identifying that both these subgroups were at greater risk of delivering low birth weight infants, and so it was suggested that gaining at the upper end of the spectrum would protect against this. However the updated report found no evidence to support this recommendation and thus the latest guidance is universal (IOM, 2009).

Table 3 IOM recommendations for rate of weight gain during pregnancy

| BMI | Category | Weekly gain lbs per week (range) | Weekly gain grams per week (range) | Total weight gain Range |
|-----------|------------------------|--|--|---------------------------------|
| < 18.5 | Underweight | 1 (1 -1.3) | 453g (453-589) | 28 - 40 (lbs) 12.5 - 18 (kg) |
| 18.5-24.9 | Ideal weight | 1 (0.8-1) | 453g (362-453) | 25 - 35 (lbs) 11.5 - 16 (kg) |
| 25-29.9 | Overweight | 0.6 (0.5- 0.7) | 276g (226-317) | 15 - 25 (lbs) 7 – 11.5 (kg) |
| > 30 | Obese class 1,2 & 3 | 0.5 (0.4-0.6) | 226g (181-272) | 11 - 20 (lbs) 5 – 9 (kg) |

Adapted from IOM 2009

The 1990 guidelines were subject to much criticism due in part to the fact that the total recommended weight gains were far more than originally thought to be appropriate and that also there was no upper limit set for weight gained by women who were obese. Critics of the IOM guidelines believe that gestational weight gain within the ranges is more likely to predispose women to obesity than improve pregnancy outcome. Writing in the *Lancet*, researchers questioned the rationale for producing guidelines for weight gain in pregnancy (Feig and Naylor, 1998). They suggested that the guidelines are based on observational studies with a number of confounders, and that these studies demonstrated associations of weight gain and pregnancy outcome, (namely low birth weight) but did not provide causal inferences. Therefore, they argue that advocating higher weight gains to protect against fetal undernourishment is not appropriate when many other factors are more likely to increase the risk (e.g. social class, smoking, minimal antenatal care). However many studies have provided evidence that gaining within the recommended ranges results in optimum pregnancy outcome (Schieve et al., 1998a, DeVader et al., 2007, Abrams et al., 2000, Siega-Riz et al., 2009). In these studies, the pregnancy outcomes comprised: gestational duration, fetal growth, birth weight, mode of birth, and maternal postpartum weight retention. The latest 2009 guidelines now include an upper limit for obese women, though it is interesting to note that the IOM recommendations do not provide separate ranges for each of the three different classes of obesity.

There have been three notable large scale studies evaluating the IOM guidelines which have found fault with the ranges, particularly those for women identified as obese. An American study by Schieve and colleagues (1998) looked at data collected over a three year period as part of a pregnancy nutrition surveillance system. Their analysis of 173,066 records found that gaining within the IOM ranges was protective against delivering term infants with a low birth weight for women with BMI < 25, but provided limited benefit to those identified as overweight or obese (Schieve et al., 1998a) However, it is worth noting that this study did not gather data on maternal complications associated with excessive weight gain such as gestational diabetes, hypertension or pre-eclampsia, rather it looked only at birth weight as the outcome measure. Another limitation of this study is that the BMI was calculated by self-reported weight and height measurements, which is known to result in an underestimation of the number of women with a raised body mass index (Roberts, 1995). However, a larger scale Swedish study addressed both these limitations. The study by Cedergren (2007) looked at data gathered on 298,648 Swedish women from the National Birth Register where information on pregnancy outcome including maternal complications was recorded (Cedergren, 2007). Unlike Schieve's study, BMI was

calculated by clinician recorded measurements of women's weight and height. This study found that there was a reduced risk of adverse pregnancy outcomes with significantly lower weight gains than the IOM guidelines particularly for those women in obese categories.

In a separate study, Kiel and Colleagues (2007) researched gestational weight gain in obese women to examine the risk of pregnancy complications (Kiel et al., 2007). This American study was a large study of 120,251 obese pregnant women delivering at full term, live singleton infants. Their retrospective study found that minimal or no weight gain in obese women was associated with fewer pregnancy complications, and therefore concluded that individual guidelines for appropriate weight gain in pregnancy should be developed for each of the obese categories. This contrasts with the work of Kramer & Kakuma (2003) who produced a Cochrane review into energy and protein intake in pregnancy (Kramer and Kakuma, 2003). The aim of their review was to assess the effect of reducing or increasing energy or protein intake during pregnancy. Of the trials studied, only three were found to be pertinent to energy restriction in women who were either overweight or who exhibited high gestational weight gain (total of 384 women). The outcome measures assessed were maternal weight gain, rates of hypertensive disorders such as pre-eclampsia and pregnancy induced hypertension, as well as infant birthweight. They concluded that energy restriction for women with a raised BMI or for high weight gainers in early pregnancy was associated with lower rates of maternal weight gain, though this had no impact on pregnancy induced hypertensive disorders. The results of two trials reporting on birthweight were ambiguous; one found no effect on birthweight whilst the other found a significant adverse effect on infant birthweight. The authors of the review advised against energy restriction to this population due to a lack of evidence as to the benefit alongside the possible harmful effects on the fetus. Although this review was last assessed as being up-to-date in November 2006, it is worth noting that the three trials included in this review are between 17 – 35 years old. With much interest being paid to this area of research in recent years, this section of the Cochrane review may no longer be deemed applicable and there is scope for updating it.

Although the large scale studies identified that the IOM guidelines for obese women require modification, the revised guidelines published in 2009 do not differentiate between the obese categories and although they now provide a range for this category, it far exceeds those parameters suggested by both Kiel and colleagues (2007) and Cedergren (2006). It could be argued that the weight gain requirements of someone with a BMI of 30 may be very different to a woman with a BMI of 60, though the IOM recommendation would be that both should gain within the same range (11-20 lbs).

Repeated studies have found that a high number of women gain in excess of the recommended gestational weight gain, and ranges between 20-60% of pregnant women (Walker, 2007, Schieve et al., 1998b, Cedergren, 2006, Chu et al., 2009). Many women will identify pregnancy as the origin for their problems with excess weight (Ellison and Harris, 2000, Linne and Rossner, 2003). This would appear to be supported by the evidence. Two studies (Rooney and Schauburger, 2002, Linne et al., 2004) addressed the issue of weight retention following birth. Both studies found a strong association between women who had weight retention following excessive gestational weight gain and risk of long term obesity.

In those countries where the IOM guidelines for gestational weight gain are in use, the commonly recognised causes of excessive weight gain in pregnancy are thought to be the same as for those in the non-pregnant population, i.e. energy intake exceeding expenditure. Pregnancy is often seen as a time when women can consume large amounts of food, and over indulge with the misguided assumption that they should be “eating for two”. It is also thought to be a time when women should rest and not exert themselves; both these commonly held beliefs if adhered to, are more likely to predispose women to excessive gestational weight gain.

1. 1. 4 Current clinical practice in the United Kingdom

1. 1. 4. 1 UK guidance on gestational weight gain

At present, clinical guidelines on appropriate weight gain in pregnancy in the UK do not exist. The Food Standards Agency and Department of Health have produced information for pregnant women suggesting that all individuals should expect to gain between 10 -12 kilos during pregnancy (FSA, 2009, DOH, 2007), though this is given for information purposes only, as weight gain monitoring by clinicians is not recommended (NICE, 2008), though this has not always been the case.

Historically from the 1940's women were weighed at each antenatal clinic visit to monitor the rate of weight gain (Scott and Benjamin, 1948). The reasons for monitoring weight gain were varied and ranged from assessing maternal nutrition, and therefore fetal growth through to the early detection of pre-eclampsia (Simpson et al., 1975). By the mid 1950's maternal weighing as a diagnostic tool to identify pre-eclampsia was

superseded by blood pressure measurements and urinalysis which were found to be more accurate (Nelson, 1955). Monitoring of gestational weight gain continued however for the assessment of fetal growth.

In the 1990's the practice of repeated routine weighing in pregnancy was investigated and its usefulness in practice was questioned. A widely cited British study (Dawes and Grudzinskas, 1991b) has proved to be pivotal in altering clinical practice. This retrospective study of 1092 pregnant women examined the association between weight gain in pregnancy and small for gestational age infants (SGA) as well as the development of hypertension. They found that weight gain in pregnancy had little to no predictive value in identification of women at risk of SGA infants or hypertension due to the wide variation of weight gain in both outcomes. This paper concluded with the recommendation that the practice of repeated weighing in pregnancy should cease as it was felt that it may cause undue anxiety for both pregnant women and midwives. It was this study which was incorporated as evidence by the National Institute for Clinical Excellence in their antenatal guidance where they too advised the discontinuation of routine repeated weighing of women in pregnancy (NICE, 2008). Instead NICE advise health professionals to weigh women once in early pregnancy in order to calculate their Body Mass Index. If women are identified as being either underweight (BMI <18.5) or obese class II (BMI>35), they are considered to need additional care due to their increase in risk of complications and are referred for obstetric review.

On reviewing the Dawes and Grudzinskas study (1991) and applying it to the current debate, there are three areas that may now lead clinicians to question the discontinuation of routine weighing during pregnancy. Firstly, this study did not seek to look at gestational weight gain as a means to assess maternal nutrition, rather it focused on short term fetal and maternal measures, namely that of SGA and hypertension and did not look at weight gain as a means to assess over consumption. Secondly, the available evidence at that time did not indicate that excessive gestational weight gain was linked to long term maternal obesity (Dawes et al., 1992) which is now widely recognised to be the case (Rode et al., 2012, Linne et al., 2004, Rooney and Schauburger, 2002) and therefore early detection could lead to alteration and improvement in modifiable behaviours. Lastly this research was conducted at a time when obesity in childbearing was not such a topical issue with rates of obesity in this subset of the population being less than half than they are today (Heslehurst et al., 2010), and thus may not have been considered to be a key area worthy of debate.

More recently a qualitative study conducted in the UK (Olander et al., 2011) that looked at the views of both health professionals and women regarding weight gain during pregnancy has shed new light on the issue of monitoring gestational weight gain. Both service users and providers acknowledged that, if regular weighing was reintroduced into routine antenatal care, it would facilitate discussion and provide an opportunity for women to control and monitor their weight gain.

1. 1. 4. 2 Diet and physical activity during pregnancy

It is recommended that health professionals dispel the myth about the need to 'eat for two' during pregnancy and advise on consuming a healthy diet that is not too high in fat or sugar (NICE, 2010a). The Pregnancy Book (DOH, 2009d) is intended to be given to all women when they book for maternity care, and contains a large amount of information including: details on antenatal care, preparation for labour and birth, as well as postnatal and infant care. Women are also advised on safety with regards to diet including food to avoid and preparation of foods. The Eatwell plate is also included to illustrate what is meant by healthy diet, and provides a visual representation of the daily recommended amounts of all food groups. Although there has been some criticism of the Eatwell plate due to it containing large quantities of foods with a high glycaemic index and refined sugars (Harcombe, 2010), it is still a widely used tool for promoting healthy eating within the NHS. In accordance with the Eatwell plate, women are advised that meals should be predominantly based upon carbohydrates such as potato, pasta or rice and where possible they should opt for wholegrain. Consuming five portions of fruit or vegetables a day is also promoted. On the topic of consumption of fat, women are advised to choose low fat versions of milk and cheese and have lean meat. It is worth noting that there are some notable omissions on the Eatwell plate and in the Pregnancy Book regarding a healthy diet, including: reducing the consumption of processed food or meat, limiting salt intake, and drinking plenty of water.

Research into dietary patterns during pregnancy has shown that women are able to modify their diet avoiding those foods that are seen as being unsafe to consume (liver, caffeine, soft cheese etc.), but appear to be less likely to follow recommendations to eat a healthy well-balanced diet (Crozier et al., 2009b, Inskip et al., 2009, Verbeke and De Bourdeaudhuij, 2006). This may be due to the degree to which health professionals discuss these recommendations. A qualitative study looked at verbal and written nutritional information provided by midwives

and identified that solely providing literature on diet recommendations is not enough and requires verbal communication to support it (Szwajcer et al., 2009). Women have also reported that dietary advice was given too late in the pregnancy, and they would have welcomed discussion regarding their diet from the outset of maternity care (COI and FSA, 2007).

So it would seem that the Pregnancy Book alone may not be enough to ensure that dietary messages for pregnant women are being heard and understood, and midwives should endeavour to facilitate discussion early on in pregnancy.

When it comes to physical activity the Chief Medical Officer in 2004 advised that in order to promote optimal health, all adults should do at least 30 minutes of activity five times a week (DOH, 2004a). However, according to the Welsh Health Survey, only 29% of women of childbearing age living in Wales are actually meeting these requirements (WAG, 2007).

NICE antenatal guidance recommends that pregnant women who wish to undertake exercise during pregnancy should be advised that there are no known negative effects of moderate exercise on the fetus, but identifies that some sports may increase risk of abdominal trauma and that women should be informed of these dangers (NICE, 2008). This clinical guidance does not go so far as to recommend that all pregnant women should partake in exercise, however, the Royal College of Obstetricians and Gynaecologists (RCOG) makes this explicit and advises that almost all pregnant women should be encouraged to participate in exercise as part of a healthy lifestyle (RCOG, 2006), with exception of those women with premature rupture of membranes (PROM), threatened premature labour, vaginal bleeding or a medical disorder that contraindicates exercise. In contrast to the antenatal clinical guidance from NICE their more recent public health guidance called 'Weight management before, during and after pregnancy' (NICE, 2010d), clearly documents that all women should be advised to undertake moderate intensity activity of at least 30 minutes daily.

There have been a number of studies looking at effects of maternal exercise during pregnancy to both mother and infant. A Cochrane review of trials assessing aerobic exercise during pregnancy was produced in 2006 (Kramer and McDonald, 2006). Eleven trials that used interventions to increase aerobic exercise in pregnant women were included in the review, none of which were thought to be considered of a high methodological quality. Outcome measures from the trials included: alteration in maternal fitness and anthropometric measures, pregnancy outcome such as preeclampsia and length and mode of birth, as well as foetal/neonatal outcomes (stillbirth, prematurity, birthweight,

and small for gestational age). Six of the seven studies that report on levels of maternal fitness found improvement of which five study findings were reported to be significant. Other than improvement in physical fitness levels, the authors found there to be insufficient evidence relating to the risks or benefits for either mother or infant of regular exercise during pregnancy.

However, more recently there have been three large Danish Studies which investigated the effect of physical activity on pregnancy outcome (Madsen et al., 2007, Juhl et al., 2008, Hegaard et al., 2009). Madsen *et al.*, (2007) examined the association between physical exercise and risk of miscarriage, this large study collected data on the exercise of 92,671 pregnant women. They found that 47% reported exercising during pregnancy. The authors identified that there was a slight increase in risk of miscarriage in women undertaking high impact exercise in early pregnancy, but no association was found between exercise and miscarriage after 18 weeks gestation. However the authors suggested caution in interpreting results as bias due to the retrospective data collection may account for part of the association. They also stressed that positive effects of exercise were widely recognised by study participants.

The study by Juhl *et al.*, investigated the association between exercise and premature labour (N= 87,232), and found that the majority of women in their study did not engage in any physical activity in pregnancy (63%). Those women who reported being physically active in pregnancy were not found to be at an increased risk of preterm birth but in fact the findings suggest a small protective effect and as such do not contradict the recommendation that pregnant women should undertake moderate levels of physical activity (Juhl et al., 2008).

Hegaard and colleagues' (2009) research used secondary data collected for a previous study between 1989-1991 and comprised of questionnaire responses and pregnancy outcome data on 4558 pregnant women. The recent interest in Denmark of the impact of physical activity on pregnancy sparked this piece of secondary data analysis. Their results found no association between leisure-time physical activity and infant birthweight and they therefore recommend that women should be reassured that physical activity whilst pregnant does not pose a risk to infant birthweight.

A controversial study, again conducted in Denmark found that leisure time activity, in excess of 270 minutes per week in early pregnancy was linked with the development of pre-eclampsia (Osterdal et al., 2009). Following the early online publication of this study's findings in the British Journal of Obstetrics and Gynaecology, the RCOG, in response produced a statement reiterating the importance of light to moderate exercise

during pregnancy and, in line with Department of Health's advice for the non-pregnant population, they recommended that pregnant women should engage in 30 minutes of exercise daily (RCOG, 2008a) which equates to 210 minutes of exercise per week, levels which have no known association with pre-eclampsia.

More recently a Spanish study (Barakat et al., 2012) explored the effects of a structured moderate intensity programme of exercise on mode of birth and neonatal outcomes. This was a relatively small study with 290 participants who attended a structured programme of exercise throughout their pregnancy. Results indicated that regular exercise during pregnancy reduced the number of caesarean sections and instrumental births while other outcomes were unaffected. Based on the results, the authors concluded that moderate intensity exercise should be recommended for healthy pregnant women.

There have been a small number of research studies exploring the physical activity and exercise behaviours of pregnant women. Clarke and Gross (2004) undertook a survey of healthy primiparous pregnant women ($n=57$) in the UK. The purpose of the study was to examine the effect that pregnancy had on the exercise patterns of healthy low risk women and to explore their beliefs regarding exercise in pregnancy (Clarke and Gross, 2004). Their findings highlighted that women viewed rest and relaxation as important health behaviours during pregnancy; conversely exercise was viewed in terms of the risk it posed to the health and wellbeing of the developing baby. They also found that commonly those women who reported regularly exercising prior to pregnancy ceased to engage in physical activity when pregnant. The majority of participants in this study reported that their beliefs about exercise during pregnancy was influenced by family and friends as well as the media, very few identified their midwife as a source of information.

A similar American study conducted by Symons Downs and Hausenblas (2004), identified many barriers that prevented women from commencing or maintaining adequate amounts of physical activity. Their retrospective study of postpartum women ($n=74$) in the USA also used survey methods including open and closed questions to obtain data on both their behaviour and their beliefs regarding exercise patterns during pregnancy. Participants identified many barriers to exercise including, physical constraints such as nausea or getting too big, as well as having a lack of time available (Symons Downs and Hausenblas, 2004). As with the Clarke and Gross study (2004), their findings indicated that women's beliefs regarding exercise during pregnancy was most commonly influenced by their partner or husband and family members and not by their midwife.

More recently a qualitative British study was conducted with pregnant women who had a raised BMI (>25). Participants were interviewed to explore their views of physical activity during pregnancy (Weir et al., 2010). They too identified barriers such as nausea and increasing size as well as a perceived lack of time. Interestingly the women cited work as being a barrier, not only because it gave them less leisure time but also due to feelings of physical exhaustion following the working day. With the majority of first-time pregnant women being in employment, this would seem to be a particularly pertinent point. As with the Clarke and Gross study conducted 7 years earlier, these authors also found that women reported a lack of consistent information, advice and support regarding exercise during pregnancy from their midwife and instead sought this from family members and the media. The authors noted that the associated benefits of staying physically active during pregnancy as reported by participants related only to their own health, (e.g. to minimise their gestational weight gain) and not that of their baby. Indeed it was recognised that for some women exercise during pregnancy was seen as a potential threat to the health of their offspring. The authors conclude by highlighting the need for support and advice regarding exercise during pregnancy.

There appear to be many barriers that prevent women from undertaking regular exercise during pregnancy, though some of the issues could be addressed through the provision of consistent information, advice and encouragement from their midwife that includes information on the benefits of exercise for both the mother and her developing baby.

1. 1. 5 Determinants of excessive gestational weight gain

There is wide agreement that pregnancy is considered to be a life-event for the development and promotion of obesity (Gore et al., 2003, Siega-Riz et al., 2004, Gunderson and Abrams, 2000). In those countries where weight gain in pregnancy is monitored, a number of risk factors for excessive weight gain have been identified, and an understanding of these risk factors would allow for the targeting of interventions to those most likely to gain excessive weight.

1.1.5.1 Pre-pregnancy BMI

Several studies have linked pre-pregnancy BMI to excessive weight gain in pregnancy, although there is conflicting evidence on which weight category is at most risk. Two studies identified that being overweight or obese (BMI>25) prior to pregnancy increased the risk of excessive gestational weight gain (Herring et al., 2008, Strychar et al., 2000) though it is not possible to assess which was most likely to be at risk as the results of these studies combined both overweight and obese categories. However Wells and colleagues (2006), differentiated between the two categories and found that those who were identified as being obese prior to pregnancy were more prone to excessive gestational weight gain than those who were in other weight categories (Wells et al., 2006). This is in contrast to three other studies which found that women whose pre-pregnancy BMI identified them to be overweight were significantly more likely to experience excessive weight gain than those who were obese (Schieve et al., 1998b, Brawarsky et al., 2005, Chu et al., 2009). In a large scale study Schieve *et al.*, (1998b) assessed trends of weight gain in pregnancy of 120,000 women, and found 62.7% of overweight women gained in excess of IOM recommendation as opposed to 45.6% of obese women. In a smaller scale study (N=1100), Brawarski and colleagues (2005) found 73% of overweight women gained in excess of the recommended weight gain compared to 53.5% of obese women. And finally Chu *et al.*, (2009) in their study analysed data gathered from the American Pregnancy Risk Assessment Monitoring System (PRAMS), where pregnancy information and gestational weight gains are recorded. Their analysis of 52,988 eligible records found that as much as 60% of overweight women gained above the recommended limit for their BMI category as opposed to 25% of obese women. Their study concluded that as a result of excessive gestational weight gain, a high number of women in overweight categories prior to pregnancy were likely to become obese. There is clearly some debate regarding which category is most likely to be at risk of excessive weight gain in pregnancy, though it is evident that having a raised BMI prior to conception is a risk factor.

1. 1. 5. 2 Social determinants

Ethnicity has been implicated as a risk factor for excessive gestational weight gain, though the evidence is contradictory. A study by Wells *et al.*, (2006) which looked at weight gain from one American state, found Black non-Hispanic women were the most likely to gain in excess of recommendations. Similarly a small study of Black and Hispanic women living in New York identified that they were at increased risk of excessive weight gain, indeed 100% of those with a raised BMI prior to pregnancy gained more than the IOM recommendations (Lederman *et al.*, 2002). However this study was very small ($n=47$) and the data regarding height, pre-pregnancy weight and gestational weight gain were gathered through self-reporting so accuracy is not guaranteed. Both these studies may also be skewed by the provider advice given to Black women. Because IOM at the time advocated that Black women should be advised to gain at the upper end of the weight range, it is feasible that this would increase the number of women gaining in excess. However, in contrast to these two studies, American data collected for the Centres for Disease Control and Prevention for the Pregnancy Nutrition Surveillance System (PNSS) demonstrated that White women are more likely to gain excess weight in pregnancy than other races or ethnic groups. Data was collected from 28 States on more than 1.1 million low income women who were enrolled on public health programmes, and the annual report summarised the results. In the most recent PNSS report (Reinold *et al.*, 2009) 47.4% of White women gained in excess as opposed to 42.2% of Black women or 38.2 % Hispanic women. Although this surveillance looks only at women with low income, the number of women included in the sample is vast and therefore demonstrates that white women disadvantaged by income are at increased risk of excessive gestational weight gain.

Cultural beliefs may also be attributable to excessive gestational weight gain as it is recognised that some cultures have differing ideals regarding body shape and image during pregnancy (Gray-Donald *et al.*, 2000).

Laraia and colleagues have linked environmental factors to both inadequate and excessive gestational weight gain. Two studies have been conducted which found that both neighbourhood disadvantage (Laraia *et al.*, 2007) and proximity of supermarkets (Laraia *et al.*, 2004) may influence levels of Gestational weight gain. However, there is insufficient evidence to identify the specific part that cultural, social and environmental contexts play in excessive gestational weight gain, indeed the IOM advise further research into these areas (IOM, 2009).

Parity and age have both been shown to have an effect on weight gain during pregnancy. Results from a number of studies have shown that nulliparous women put on more weight in pregnancy than multiparous women (Dawes and Grudzinskas, 1991a, Wells et al., 2006, Caulfield et al., 1998, Chu et al., 2009). Age as a risk factor is less clear cut. Studies have demonstrated that adolescents are at increased risk of excessive weight gain (Scholl et al., 1995, Howie et al., 2003, Chu et al., 2009). It has been shown that adolescents are more prone to higher levels of gestational weight gain due to continued maternal growth, therefore it has been argued that adolescents should be excluded from weight gain studies to prevent bias in the results (Gunderson and Abrams, 2000). Again the reason for this subset of the population being at increased risk of gaining in excess of the recommendations may be due to provider advice as the original IOM guidance advocated that adolescents gain at the higher end of their BMI weight range. Given the fact that adolescent women are still growing, one may question the appropriateness of using the IOM guidelines for weight gain in this subset of the population. However, the latest IOM guidelines are clear in their recommendations that all adolescents (age<20) should follow the same guidelines as their adult counterparts (IOM, 2009) and no longer advise aiming to gain towards the upper ranges for their weight category.

1. 1. 6 The views of women and clinicians

Minimal research has been conducted looking at pregnant women's views regarding gestational weight gain. In total five qualitative studies were found, of which three looked at the beliefs of minority ethnic groups in America regarding weight gain in pregnancy (Tovar et al., 2009, Thornton et al., 2006, Groth and Kearney, 2009), and one British study looked at the views of women of above average weight regarding appropriate gestational weight gain (Wiles, 1998). And more recently, Olander and colleagues explored the views of both women and health professionals regarding weight gain in pregnancy (Olander et al., 2011).

Thornton and colleagues (2006) researched the role of social support regarding weight, diet and exercise in pregnant and postpartum women. They conducted one to one interviews with Latino women ($n= 10$) and also with an individual identified by the participating woman as most likely to influence their beliefs and behaviour ($n=10$). For the majority of participants the individual identified as most influential was their

husband/partner ($n=8$) although one identified her mother and one a sister in-law. Thornton's study found that social support was key to women's views of a healthy weight and lifestyle as they identified that significant others were likely to influence pregnant women's eating and physical activity behaviour. It would seem that the role that partners and family play in the lifestyle behaviours of pregnant women is an area that could be explored further when midwives discuss these behaviours with women.

Groth and Kearney (2009) interviewed ethnically diverse postnatal women ($n=49$) to ascertain their views on gestational weight gain following pregnancy. Their sample comprised white women ($n= 12$), Black women ($n=24$) and Hispanic women ($n=13$). Data were collected by researchers conducting one-to-one interviews using a semi-structured questionnaire. Responses were documented by the researchers using the woman's own words and the interview was not audio recorded. No personal data was obtained regarding individuals' own gestational weight gain and the authors defend this by highlighting that the goal of the study was to obtain views not factual data. The authors do not disclose the parity of their participants. The findings of this study identified that these women were aware of gestational weight gain and its possible effect on women and their infants. Despite the IOM guidelines more than half of those questioned did not know what was considered an appropriate amount of weight gain. The authors conclude that health providers were ideally suited to educate and encourage women to make healthier behavioural decisions during pregnancy to ensure weight gain is within appropriate ranges. Content analysis was carried out on responses using a combination of qualitative and quantitative strategies which is evident by their use of numerical data presented in tables to demonstrate the views of participants. It is interesting that the researchers did not see the value in gaining data on women's experience of weight gain, as it could be argued that women's views of gestational weight gain would be informed by their own experience.

The study by Tovar *et al.*, (2009) was a pilot study evaluating knowledge, attitudes and beliefs regarding gestational weight gain. A total of 29 Hispanic women were recruited to four focus groups. Areas that were addressed during the focus groups were; awareness of the IOM guidelines, feelings and attitudes about gestational weight gain and beliefs relating to the main contributors to gestational weight gain. Many women reported receiving information regarding appropriate levels of weight gain, though this advice was varied and often inconsistent with the IOM guidelines. A significant proportion of women with a raised BMI received no advice from health professionals regarding appropriate gestational weight gain. Those who reported not receiving advice gained in excess of the recommended guidelines. The majority of all women felt negatively about their weight gain. Diet was felt to be the biggest contributor to weight gain and interestingly lack of activity was not

identified as a cause. As with Thornton's (2006) earlier research, Tovar *et al.*, (2009) found that many women received support and advice from family members regarding appropriate levels of weight gain in pregnancy. The authors of this study concluded that improved communication of health care professionals regarding appropriate gestational weight gain was needed and a better understanding about the weight gain beliefs would assist in providing support. Although the work of Tovar and colleagues is concerned with the particular needs of a subset of the population in America, similar results can be found in an English study (Wiles, 1998).

The views of 37 women with above average weight regarding appropriate weight gain in pregnancy were examined. Wiles found that although all the women had received written information on average weight gain in pregnancy, they felt that this was for the benefit of women who did not have a 'weight problem', and therefore did not apply to them. A total of 20 women reported being given advice regarding their diet, but this did not cover weight gain. Only one woman reported being informed about the appropriate level of gestational weight gain. It was evident that the women felt that the advice being given by their midwives on weight gain was inadequate. Some women reported receiving negative comments from health professionals regarding their size. The study found that in the absence of specific weight recommendations, this sample constructed their own views on appropriate gestational weight gain. This construct was informed by the desire to minimise the weight gained as a result of pregnancy balanced against the perceived needs of their growing unborn baby. In accordance with the American study, Wiles identified that clinician's communication of gestational weight gain needed to be informed by an understanding of the beliefs of these women. She also suggested that specific literature regarding appropriate gestational weight gain should be developed and provided to women with a raised BMI.

Olander *et al.*, (2012) conducted an exploratory study in the UK using focus groups to explore pregnant and postnatal women views and interestingly also conducted a focus group with health professionals. They report that they did not collect demographic data of participants due to the funders (a local council) wishing to ensure complete anonymity of participants. As with Wiles' study the authors found that childbearing women felt they were not being provided with information regarding appropriate levels of weight gain, and indeed this area was not mentioned by their midwife. Therefore, the authors argued that the participants lacked concern regarding weight gain as the women felt that if it had been of relevance, then the midwife would have raised the issue and monitored weight gain during clinic appointments. This study demonstrated the high regard that the participants placed on the information and monitoring that the midwife conducts as part of routine antenatal care. Olander

and colleagues' focus group with the health professionals comprised two social workers, two children's centre managers as well as two midwives. It was highlighted that participants in this focus group were unsure of what to advise regarding weight gain which, it could be argued reflects the lack of clinical guidance in this area.

This study is of importance due to the fact that it is both recent and British, and as such provides an updated insight into the views of weight gain in pregnancy in the UK. However, the focus group designed to obtain the views of health professionals appeared only to include two practising health professionals: the midwives. The other participants involved were not, strictly speaking, health professionals, so it is not surprising that the majority of the group were unsure what to advise women regarding their gestational weight gain. The health professionals were reported to be recruited from their place of work, which given the nature of the professionals was presumably a children's centre, though this is not stated by the authors. Although it is interesting to have some insight into the views of other professionals involved in the care of women, it is disappointing that the number of midwives involved in the discussion was far outnumbered by the other professions.

There appears to be limited research into the views of clinicians on the topic of weight gain in pregnancy and only one other study was identified: A qualitative study conducted in the North East of England investigated clinicians' views of their maternal obesity training and education requirements (Heselhurst et al., 2012). The authors reported that the midwives suggested there was 'mixed messages' being given to women as on the one hand they were being informed of the importance of weight in pregnancy whilst on the other weight gain monitoring was not taking place. They noted that the midwives felt they had a lack of knowledge in the area of weight and weight gain in pregnancy and many identified a need for appropriate training and education that would inform their practice. This study highlighted that many midwives found it difficult to raise the topic of obesity and weight management with overweight and obese patients due to the associated stigma and not wishing to victimize the women (Heselhurst et al., 2012). This is supported by nursing research carried out (Brown and Thompson, 2007), which recognised that nurses working with obese patients were acutely aware that weight was a sensitive issue and that perceptions of nurses own body size impacted on the way in which the topic of weight management was broached.

In summary whilst the evidence relating to health professionals' views suggests that they are uneasy about broaching the topic of weight and weight gain due to a lack of knowledge and for fear of stigmatising individuals, it would seem that from the limited evidence, childbearing

women would welcome clearly communicated appropriate guidance in this area, provided it was done so sensitively and that the involvement of the significant others in discussions relating to lifestyle behaviours may provide women with additional support

1. 2. Review of lifestyle intervention studies

Pregnancy has been identified by many as an ideal time to address overweight and obesity as it is a time when women may well be motivated to change behaviour and lifestyle to benefit the health of their unborn child (Pope et al., 1997, Verbeke and De Bourdeaudhuij, 2006, Hall and Van Teijlingen, 2006, Phelan, 2009a) . A limited number of intervention studies were reported in the literature with the aim of improving diet and/or physical activity behaviours to reduce the risk of excessive weight gain. However, in the last 4 years the number has more than doubled. A total of 18 studies have been identified through a comprehensive review of the literature. Six relevant databases were searched (CINAHL, PubMed, OVID, ASSIA, BioMed Central, & Wiley) for peer reviewed papers published between 1990 and January 2012 using search terms; weight gain, pregnancy, intervention. The initial search produced a total of 430 papers, of which 296 were rejected at title and abstract level and a further 110 were excluded for being background or review papers. Finally twenty five full papers were retrieved and reviewed and six of these were subsequently excluded (one non English publication, one study protocol paper and four had no relevant reported outcome data). Further information on the search strategies used can be found in Appendix 1. The majority of the intervention studies reviewed had taken place in North America (n=10) followed by Europe (n=6) Australia (n=2) and Asia (n=1). No British intervention studies were found within the search, and this is likely to be due to the lack of UK guidance and monitoring on gestational weight gain. At this point it is worth noting that maternity provision varies greatly from country to country. For instance maternity care in the USA has to a large extent focussed on a medicalised approach with obstetricians being the lead professional for all women including those with uncomplicated pregnancies and birth. In contrast in the UK, although there is recognition that childbirth has been medicalised (Henley-Einion, 2009), midwives are the main care providers for women with uncomplicated pregnancies.

Table 4 Table 4 Summary of intervention studies

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* |
|-------|--------|--------------|----------|---------|----------|---------|----------------------|
|-------|--------|--------------|----------|---------|----------|---------|----------------------|

| | | | | | | | (*Adapted from Higgins & Altman 2011) |
|--|--|---|---|--|---|---|---|
| Asbee <i>et al.</i> , 2009 RCT USA | All BMI groups Any parity 79% Hispanic /African American. < 16 weeks gestation N=100 Control n=43 Index n=57 | 1)Counselled on diet- advised caloric value – 40% carbohydrates, 30% protein 30% fats. 2) Instructed to engage in moderate intensity exercise at least 3/7 preferably 5/7 3) Advised on IOM guidelines and weighed at each visit 4) Participants instructed to alter lifestyle according to gestational weight gain | Dietician- dietary advice HCP- advised on PA and GWG. Monitored GWG. | Standard AN care this included standard literature on diet and exercise in pregnancy. Weight measured at each A/N appointment | GWG= weight on day of birth minus baseline self-report pre-pregnancy Adherence to IOM Obstetric outcomes | Less GWG in study group. No sig difference in adherence of IOM guidelines., No difference in obstetric outcomes | No mention of theoretical underpinning <u>Quality:</u> Risk of Bias – No blinding of outcome assessors, unclear whether incomplete outcome data were addressed. Other sources of bias - Unable to achieve predetermined power. Measures of pre-pregnancy weight questionable due to self report. |
| Claesson <i>et al.</i> , 2007 Non RCT Sweden | BMI >30 Any parity 10-12 weeks gestation N=348 Control n=193 Index n=155 | 1) Assessment of knowledge and then Educated as to risks of excessive gestational weight gain 2) Invited to 30 min once a week of weight control and supportive talk 3) Invited to attend aqua aerobics 1-2 per week 4) MI used to change behaviour | Midwife delivered all components of intervention | Standard AN care | GWG= weight at last Antenatal check-up minus weight at first Antenatal check-up Guideline of < 7kg Mode of birth and neonatal outcome | Less GWG in study group. Higher percentage gained <7kg No difference in mode of birth or neonatal outcome. | Non randomised No mention of theoretical underpinning <u>Quality:</u> Risk of bias – No blinding of outcome assessors unclear whether incomplete outcome data were addressed Not adequately powered to detect differences in obstetric outcome. |
| Gray Donald <i>et al.</i> , 2000 Time series control trial Canada | Cree community All BMI groups Any parity <26 weeks gestation N= 219 Control n= 107 Index n= 112 | 1) Approx x4 Individual Dietary advice sessions to increase fruit and vegetable intake and decrease ED foods 2) Radio broadcasts about healthy eating in pregnancy 3) literature about diet in pregnancy 4) Shopping tours & Cooking demos. 5) Exercise walking groups offered 6) Encouraged to stay with IOM guidelines | Nutritionist delivered all components of intervention and worked alongside the Health Care Providers. | Standard AN care in same community 7 months prior to intervention | GWG Dietary intake Plasma glucose levels | No difference in GWG No difference in dietary intake No difference in glucose levels | Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|-------|--------|--------------|----------|---------|----------|---------|---|
|-------|--------|--------------|----------|---------|----------|---------|---|

| | | | | | | | |
|---|---|---|--|---|---|---|--|
| <p>Guelinckx <i>et al.</i>, 2010 RCT Belgium</p> | <p>BMI >29 Any parity <15 weeks gestation N= 195 <i>Control n= 65</i> <i>Passive n=65</i> <i>Index n=65</i></p> | <p>Passive group - given literature on 1) nutrition 2) PA.</p> <hr/> <p>Index group 1) 3x one hour group counselling. (5 women per group) 2) Energy intake not restricted but advised to swap ED foodstuffs with healthy alternatives 3) PA literature provided 4) If exceeded IOM guidelines advised to limit ED foods</p> | <p>Health Care Provider gave out literature.</p> <hr/> <p>Nutritionist delivered all components of intervention to index group</p> | <p>Standard AN care</p> | <p>GWG= weight on day of birth minus baseline self-report pre-pregnancy Adherence to IOM Dietary intake Physical activity Obstetric + neonatal outcomes</p> | <p>No difference in GWG No difference in adherence to IOM Improvement in dietary intake in both passive and index groups. No change in PA No difference in neonatal outcome</p> | <p>No mention of theoretical underpinning <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Sequence generation and allocation concealment data not clearly described. Unclear whether incomplete outcome data were addressed Other sources of bias- measures of pre-pregnancy weight questionable due to self report Not adequately powered to detect differences in obstetric outcome.</p> |
| <p>Huang <i>et al.</i>, 2011 RCT Taiwan</p> | <p>All BMI Groups Any parity <16 weeks gestation N= 125 <i>Control n=64</i> <i>Index n=61</i></p> | <p>1) 6x meeting with trained HCP who made an individual dietary and PA plan. 2) Goal setting 3) GWG goal setting 4) If not meeting guidelines support and additional dietary and PA goal setting</p> | <p>A trained nurse specialist delivered all components of the intervention</p> | <p>Standard AN care this included routine lit of eating and exercise in pregnancy as well as x3 educational programme for pregnant women (once a trimester)</p> | <p>GWG Total recommended GWG 10-14kg Change in dietary and PA behaviour Scores for : Depression Perceived social support Self-efficacy Body image</p> | <p>Mean GWG higher than recommended but still sig lower than control group. +ve Changes in both dietary and PA behaviour Improved scores for: Depression Perceived of social support Self-efficacy Body image - during pregnancy but not in PN period..</p> | <p>No mention of theoretical underpinning <u>Quality:</u> Risk of bias – allocation concealment not clearly described. Unclear whether incomplete outcome data were addressed Other sources of bias – unclear as no mention of how GWG measured</p> |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|--|--|--|---|--|---|---|
| Hui <i>et al.</i> , 2012 RCT Canada | All BMI groups Parity not recorded <26 weeks gestation N=190 Control n= 88 Index n= 102 | 1) 2x Personalised dietary counselling after food frequency assessment. 2) Advised and assisted exercise regime of: 3-5 a week for 30 mins. – group sessions and home 3 day food diary and physical activity questionnaire at baseline and 2 months after recruitment | Dietician delivered dietary counselling. Researchers gave info re: PA | Standard AN care this included routine lit of eating and exercise in pregnancy 3 day food diary and physical activity questionnaire at baseline and 2 months after recruitment | GWG Adherence to IOM Food intake Physical activity | No sig different in GWG Reduced incidence of EGWG Improved PA Improved diet | No mention of theoretical underpinning <u>Quality:</u> Risk of bias – Unclear whether incomplete outcome data were addressed |
| Jackson <i>et al.</i> , 2011 RCT USA | All BMI groups Any parity 26 weeks gestation N = 287 Control n=153 Index n= 134 | 1) Computerised video counselling following behavioural assessment at recruitment and 4/52 afterwards 2) Education based on MI Intervention comprised; Counselling session video 3) Cue sheet for clinician 4) Educational worksheet | Video doctor gave counselling. Health Care Provider was given cue sheet to support counselling session. | Standard AN care and at recruitment and 4/52 weeks afterwards computerised behavioural assessment. – including self-report weight, height, food intake, exercise habits, knowledge of healthy eating in pregnancy | GWG Adherence to IOM Dietary intake Physical activity satisfaction with video counselling | No difference in GWG Same number of EGWG Improvement in diet Improvement in activity 98% satisfaction with counselling | No mention of theoretical underpinning Validity of pre-pregnancy weight questionable due to self report <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |
| Jeffries <i>et al.</i> , 2009 RCT Australia | All BMI groups Any parity <14 weeks gestation N= 236 Control n= 111 Index n=125 | 1) Weight gain to within IOM guidelines. – 2) Regular weighing by participants 3) Recording on individual chart | Researchers gave participants chart and asked them to self-monitor their weight and mark on chart. | Standard AN care Weighed at recruitment and at 36 weeks gestation. But not advised on GWG | GWG Adherence to IOM Obstetric outcomes | Less GWG in overweight <u>but not</u> obese women. Slightly reduced incidence of EGWG No significant differences in obstetric outcome | No mention of theoretical underpinning <u>Quality:</u> Risk of bias - Unclear whether incomplete outcome data were addressed. Other sources of bias – not adequately powered to detect difference in obstetric outcome. |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|--|--|---|--|---|--|---|
| Kinnunen <i>et al.</i> , 2007 Non RCT Finland | All BMI groups Primiparous only 8-9 weeks gestation N= 105 Control n=56 Index n= 49 | 1) X3 counselling sessions to improve diet. (3 meals a day, fruit and vegetables, increased fibre, restrict sugar intake) 2) X 5 counselling session to achieve PA 30 mins 5 days a week Goal setting PA & Diet record kept 3) Literature to take home 4) IOM guidelines for appropriate GWG used and explained to participants | Public Health Nurse delivered all elements of intervention | Standard AN care This included: brief advice giving on diet, activity and weight gain (not IOM) | GWG Adherence to IOM Physical activity Dietary intake | No difference in GWG No difference in rate of EGWG No difference in levels of PA Some improvement in diet- fruit and fibre intake | Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed Other sources of bias – not adequately powered to detect reduction in GWG |
| Mottola <i>et al.</i> , 2010 Historical Control Trial Canada | BMI> 25 Any parity 16-20 weeks gestation N= 325 Control n=260 Index n=65 | 1) Counselling x1 regarding diet: Keep 1 day food diary per week Calories limited to 2000/day Diet breakdown Carbohydrates 40-50% Fat 30% Protein 20-30% 2) Walking 3-4x week @25 mins building up to 40 mins& Advised target to increase HR. 3) Pedometer | Dietician delivered dietary advice/counselling Kinesiologist delivered physical activity elements of intervention. | Historical control matched for birth outcomes only Standard AN care | GWG Adherence to IOM Energy intake Physical activity Post-partum weight retention. Birth outcomes | Reduced risk of weekly EGWG during intervention however participants had EGWG prior to commencing study and therefore mean GWG for entire pregnancy was over IOM guidelines. Reduced caloric intake & Increased physical activity. No difference in birth outcomes | No mention of theoretical underpinning Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |
| Olsen <i>et al.</i> , 2004 Historical Control Trial USA | BMI >19.8 and < 30 Any parity <26 weeks gestation N= 517 Control 359 Index n= 158 | 1) Education on healthy diet and PA in pregnancy 2) Goal setting 3) IOM guidelines for appropriate GWG used and explained to participants 4) 5x 1 page Newsletters | Health Care providers delivered all elements of intervention | Historical control Standard AN care | GWG Adherence to IOM Postpartum weight retention. | No difference in GWG No difference in rate of EGWG -Except in low income group. OW women less likely to have postpartum weight retention | No mention of theoretical underpinning Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|---|--|---|--|--|--|---|
| Phelan <i>et al.</i> , 2011 RCT USA | BMI 20 -39 Any parity 10-16 weeks gestation N= 401 <i>Control n =200</i> <i>Index n= 201</i> | (Based on Social Learning Theory) 1) Session with counsellor - given individual calorie goals emphasis on reducing high fat intake 2) Advised physical activity for 30 mins on most days (5/7) 3) 3x telephone support calls. 4) Weekly automated post cards advising on healthy diet 5) Advised on IOM GWG guidelines 6) Feedback of GWG from each clinic visit and graph of GWG. 7) If not meeting guidelines support and additional telephone call until meet guidelines | The researchers delivered all elements of intervention | Standard AN care where they received usual advice on healthy diet and were routinely weighed at each AN appointment. Sent monthly newsletter giving general maternity info and advice to aid retention. | GWG Adherence to IOM Postpartum weight retention | No difference in GWG Reduction in EGWG in normal weight women only Reduction in postpartum weight retention in all BMI groups. | Validity of pre-pregnancy weight questionable due to self report <u>Quality:</u> Risk of bias - Measures of pre-pregnancy weight questionable due to self report |
| Polley <i>et al.</i> , 2002 RCT USA | Low income women BMI 20-30 Any parity <20 weeks gestation N= 110 <i>Control n=53</i> <i>Index n= 57</i> | (Based on Social Learning Theory) 1) counselled and given literature on: healthy eating, PA, GWG, Goal setting & problem solving and self-monitoring. 2) Newsletter 3) Advised on IOM GWG guidelines 6) Feedback of GWG from each clinic visit and graph of GWG. 7) If not meeting guidelines support and additional telephone call until meet guidelines | Specially trained research staff delivered all elements of intervention | Standard AN care. | Adherence to IOM Postpartum weight retention. Dietary intake Physical activity Obstetric outcomes | Reduced EGWG amongst normal weight women No significant difference found in; postpartum weight retention, pregnancy outcomes, physical activity or dietary intake | No mention of theoretical underpinning <u>Quality</u> Risk of bias - Sequence generation and allocation concealment data not clearly described. No blinding of outcome assessors. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|---|--|---|---|--|---|--|
| Quinlivan <i>et al.</i> , 2011 RCT Australia | BMI >25 Any parity <12 weeks gestation N= 124 <i>Control n= 61</i> <i>Index n= 63</i> | 1) Brief 5 min dietary Intervention at each AN visit. 2) Continuity of carer 3) Assessment of weight at each visit 4) Assessment of mental health – depression/stress & treatment | Food technologists delivered dietary elements. The Health Care Provider gave continuity of care. Clinical psychologist assessed mental health and provided treatment where required | Standard AN care and completed baseline questionnaires on diet and physical activity levels. | GWG Raised GTT Birthweight Change in diet from first and last visit | Reduction in GWG (from 13.8 to 7k) Reduction in raised GTT No difference in birthweight change in diet – itemised log of food from previous day at each an visit by food technologist) | No mention of theoretical underpinning <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – Not adequately powered to detect reduction in GWG |
| Rosenbloom <i>et al.</i> , 2012 Historical Control Trial USA | low income women All BMI groups Any parity <20 weeks gestation N= 166 <i>Control n=109</i> <i>Index n= 57</i> | 1) Literature – Nutrition, PA and GWG guidelines + risks of EGWG Goal setting Provided with feedback by HCP re GWG and goals for exercise and diet | The Health Care Provider delivered all elements of the intervention | Historical control Standard AN care which included: Non IOM guidelines for gestational weight gain, regular recorded weighing unstructured provider advice. | GWG Adherence to IOM | Similar GWG When accounting for BMI Less likely to have EGWG | No mention of theoretical underpinning Non randomised <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias - Not adequately powered to detect reduction in GWG, Measures of pre-pregnancy weight questionable due to self report. |
| Shirazian <i>et al.</i> , 2010 Historical Cohort USA | BMI <30 Any parity ≤12 weeks gestation N=41 <i>Control n= 20</i> <i>Index n= 21</i> | 1) Educational materials- Nutrition, PA and GWG guidelines 2) Given food diary and pedometer 3) Structured group seminars On how to overcome barriers, & further educational components re diet and activity. 4) 5X one-to-one counselling sessions or telephone calls advising total gestational weight gain goals limited < 15 lbs. | Researchers delivered all components. | Historical control Standard AN care. | GWG Adherence to IOM (1990) Obstetric outcomes | Significantly less GWG in index group (average 17.86lbs as opposed to 34lbs in the control) However, majority still above guidelines No difference in obstetric outcomes | No mention of theoretical underpinning Non randomised <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – unclear as No mention of how GWG measured |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|--|--|--|--|---|--|---|
| Vinter <i>et al.</i> , 2011 RCT Denmark | BMI 30-45 Any parity 10-14 weeks gestation N= 304 <i>Control n= 154</i> <i>Index n=150</i> | 1) 4 x dietary counselling and advised to limit GWG to ≤5kg 2) Encouraged to do exercise 30 -60 mins daily -given free access to gym & pedometer -1 hour group session of moderate intensity activity and coached to increase after each session. | Dieticians delivered dietary elements and physiotherapists delivered PA elements of intervention | Standard AN care and data collected + GTT at 12-14, 28-30, 34-36 weeks Weight at each AN appointment Fitness test at recruitment & 35/40 | GWG Adherence to IOM Obstetric and neonatal outcomes Perceived improvement in diet at 35 weeks gestation. | Significantly less GWG Less EGWG- sig minority still exceeded IOM guidelines (35%) No difference in obstetric/neonatal outcomes Majority felt inclusion in study improved diet. | No mention of theoretical underpinning <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – Not adequately powered to detect differences in obstetric outcome or GWG. |
| Wolf <i>et al.</i> , 2008 RCT Denmark | BMI>25 Parity not stated ≤15 weeks gestation N= 50 <i>Control n= 27</i> <i>Index n= 23</i> | 1) 10x one hour dietetic consultation Instructed on diet composition 30 % fat, 20 % protein and 50% carbohydrates. 2) Food records allowed for individual recommendations for change. | Dieticians delivered all elements of intervention. | Standard AN care & data collection: weight, blood tests and food records at inclusion, 27 & 36 weeks. | GWG (Not IOM) Dietary intake Glucose metabolism Obstetric outcomes | Reduced GWG(half that of control) Improved dietary intake Improved glucose metabolism No negative impact on obstetric outcomes | No mention of theoretical underpinning <u>Quality:</u> Risk of bias - Allocation concealment data not clearly described. No blinding of outcome assessors. Other sources of bias |

provides a summary of the included intervention studies and the subsequent sections provide an analysis of their features and outcomes.

Table 4 Summary of intervention studies

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|--|---|---|--|---|--|---|
| Asbee <i>et al.</i> , 2009 RCT USA | All BMI groups Any parity 79% Hispanic /African American. < 16 weeks gestation N=100 <i>Control n=43</i> <i>Index n=57</i> | 1) Counselling on diet- advised caloric value – 40% carbohydrates, 30% protein 30% fats. 2) Instructed to engage in moderate intensity exercise at least 3/7 preferably 5/7 3) Advised on IOM guidelines and weighed at each visit 4) Participants instructed to alter lifestyle according to gestational weight gain | Dietician- dietary advice HCP- advised on PA and GWG. Monitored GWG. | Standard AN care this included standard literature on diet and exercise in pregnancy. Weight measured at each A/N appointment | GWG= weight on day of birth minus baseline self-report pre-pregnancy Adherence to IOM Obstetric outcomes | Less GWG in study group. No sig difference in adherence of IOM guidelines. No difference in obstetric outcomes | No mention of theoretical underpinning <u>Quality:</u> Risk of Bias – No blinding of outcome assessors, unclear whether incomplete outcome data were addressed. Other sources of bias - Unable to achieve predetermined power. Measures of pre-pregnancy weight questionable due to self report. |
| Claesson <i>et al.</i> , 2007 Non RCT Sweden | BMI >30 Any parity 10-12 weeks gestation N=348 <i>Control n=193</i> <i>Index n=155</i> | 1) Assessment of knowledge and then Educated as to risks of excessive gestational weight gain 2) Invited to 30 min once a week of weight control and supportive talk 3) Invited to attend aqua aerobics 1-2 per week 4) MI used to change behaviour | Midwife delivered all components of intervention | Standard AN care | GWG= weight at last Antenatal check-up minus weight at first Antenatal check-up Guideline of < 7kg Mode of birth and neonatal outcome | Less GWG in study group. Higher percentage gained <7kg No difference in mode of birth or neonatal outcome. | Non randomised No mention of theoretical underpinning <u>Quality:</u> Risk of bias – No blinding of outcome assessors unclear whether incomplete outcome data were addressed Not adequately powered to detect differences in obstetric outcome. |
| Gray Donald <i>et al.</i> , 2000 Time series control trial Canada | Cree community All BMI groups Any parity <26 weeks gestation N= 219 <i>Control n= 107</i> <i>Index n= 112</i> | 1) Approx x4 Individual Dietary advice sessions to increase fruit and vegetable intake and decrease ED foods 2) Radio broadcasts about healthy eating in pregnancy 3) literature about diet in pregnancy 4) Shopping tours & Cooking demos. 5) Exercise walking groups offered 6) Encouraged to stay with IOM guidelines | Nutritionist delivered all components of intervention and worked alongside the Health Care Providers. | Standard AN care in same community 7 months prior to intervention | GWG Dietary intake Plasma glucose levels | No difference in GWG No difference in dietary intake No difference in glucose levels | Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|--|--|---|--|---|--|---|
| Guelinckx <i>et al.</i> , 2010 RCT Belgium | BMI >29 Any parity <15 weeks gestation N= 195 <i>Control n= 65</i> <i>Passive n=65</i> <i>Index n=65</i> | Passive group - given literature on 1) nutrition 2) PA. Index group 1) 3x one hour group counselling. (5 women per group) 2) Energy intake not restricted but advised to swap ED foodstuffs with healthy alternatives 3) PA literature provided 4) If exceeded IOM guidelines advised to limit ED foods | Health Care Provider gave out literature. Nutritionist delivered all components of intervention to index group | Standard AN care | GWG= weight on day of birth minus baseline self-report pre-pregnancy Adherence to IOM Dietary intake Physical activity Obstetric + neonatal outcomes | No difference in GWG No difference in adherence to IOM Improvement in dietary intake in both passive and index groups. No change in PA No difference in neonatal outcome | No mention of theoretical underpinning <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Sequence generation and allocation concealment data not clearly described. Unclear whether incomplete outcome data were addressed Other sources of bias- measures of pre-pregnancy weight questionable due to self report Not adequately powered to detect differences in obstetric outcome. |
| Huang <i>et al.</i> , 2011 RCT Taiwan | All BMI Groups Any parity <16 weeks gestation N= 125 <i>Control n=64</i> <i>Index n=61</i> | 1) 6x meeting with trained HCP who made an individual dietary and PA plan. 2) Goal setting 3) GWG goal setting 4) If not meeting guidelines support and additional dietary and PA goal setting | A trained nurse specialist delivered all components of the intervention | Standard AN care this included routine lit of eating and exercise in pregnancy as well as x3 educational programme for pregnant women (once a trimester) | GWG Total recommended GWG 10-14kg Change in dietary and PA behaviour Scores for : Depression Perceived social support Self-efficacy Body image | Mean GWG higher than recommended but still sig lower than control group. +ve Changes in both dietary and PA behaviour Improved scores for: Depression Perceived of social support Self-efficacy Body image - during pregnancy but not in PN period.. | No mention of theoretical underpinning <u>Quality:</u> Risk of bias – allocation concealment not clearly described. Unclear whether incomplete outcome data were addressed Other sources of bias – unclear as no mention of how GWG measured |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|--|--|--|---|--|---|---|
| Hui <i>et al.</i> , 2012 RCT Canada | All BMI groups Parity not recorded <26 weeks gestation N=190 Control n= 88 Index n= 102 | 1) 2x Personalised dietary counselling after food frequency assessment. 2) Advised and assisted exercise regime of: 3-5 a week for 30 mins. – group sessions and home 3 day food diary and physical activity questionnaire at baseline and 2 months after recruitment | Dietician delivered dietary counselling. Researchers gave info re: PA | Standard AN care this included routine lit of eating and exercise in pregnancy 3 day food diary and physical activity questionnaire at baseline and 2 months after recruitment | GWG Adherence to IOM Food intake Physical activity | No sig different in GWG Reduced incidence of EGWG Improved PA Improved diet | No mention of theoretical underpinning <u>Quality:</u> Risk of bias – Unclear whether incomplete outcome data were addressed |
| Jackson <i>et al.</i> , 2011 RCT USA | All BMI groups Any parity 26 weeks gestation N = 287 Control n=153 Index n= 134 | 1) Computerised video counselling following behavioural assessment at recruitment and 4/52 afterwards 2) Education based on MI Intervention comprised; Counselling session video 3) Cue sheet for clinician 4) Educational worksheet | Video doctor gave counselling. Health Care Provider was given cue sheet to support counselling session. | Standard AN care and at recruitment and 4/52 weeks afterwards computerised behavioural assessment. – including self-report weight, height, food intake, exercise habits, knowledge of healthy eating in pregnancy | GWG Adherence to IOM Dietary intake Physical activity satisfaction with video counselling | No difference in GWG Same number of EGWG Improvement in diet Improvement in activity 98% satisfaction with counselling | No mention of theoretical underpinning Validity of pre-pregnancy weight questionable due to self report <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |
| Jeffries <i>et al.</i> , 2009 RCT Australia | All BMI groups Any parity <14 weeks gestation N= 236 Control n= 111 Index n=125 | 1) Weight gain to within IOM guidelines. – 2) Regular weighing by participants 3) Recording on individual chart | Researchers gave participants chart and asked them to self-monitor their weight and mark on chart. | Standard AN care Weighed at recruitment and at 36 weeks gestation. But not advised on GWG | GWG Adherence to IOM Obstetric outcomes | Less GWG in overweight <u>but not</u> obese women. Slightly reduced incidence of EGWG No significant differences in obstetric outcome | No mention of theoretical underpinning <u>Quality:</u> Risk of bias - Unclear whether incomplete outcome data were addressed. Other sources of bias – not adequately powered to detect difference in obstetric outcome. |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|--|--|---|--|---|--|---|
| Kinnunen <i>et al.</i> , 2007 Non RCT Finland | All BMI groups Primiparous only 8-9 weeks gestation N= 105 Control n=56 Index n= 49 | 1) X3 counselling sessions to improve diet. (3 meals a day, fruit and vegetables, increased fibre, restrict sugar intake) 2) X 5 counselling session to achieve PA 30 mins 5 days a week Goal setting PA & Diet record kept 3) Literature to take home 4) IOM guidelines for appropriate GWG used and explained to participants | Public Health Nurse delivered all elements of intervention | Standard AN care This included: brief advice giving on diet, activity and weight gain (not IOM) | GWG Adherence to IOM Physical activity Dietary intake | No difference in GWG No difference in rate of EGWG No difference in levels of PA Some improvement in diet- fruit and fibre intake | Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed Other sources of bias – not adequately powered to detect reduction in GWG |
| Mottola <i>et al.</i> , 2010 Historical Control Trial Canada | BMI> 25 Any parity 16-20 weeks gestation N= 325 Control n=260 Index n=65 | 1) Counselling x1 regarding diet: Keep 1 day food diary per week Calories limited to 2000/day Diet breakdown Carbohydrates 40-50% Fat 30% Protein 20-30% 2) Walking 3-4x week @25 mins building up to 40 mins& Advised target to increase HR. 3) Pedometer | Dietician delivered dietary advice/counselling Kinesiologist delivered physical activity elements of intervention. | Historical control matched for birth outcomes only Standard AN care | GWG Adherence to IOM Energy intake Physical activity Post-partum weight retention. Birth outcomes | Reduced risk of weekly EGWG during intervention however participants had EGWG prior to commencing study and therefore mean GWG for entire pregnancy was over IOM guidelines. Reduced caloric intake & Increased physical activity. No difference in birth outcomes | No mention of theoretical underpinning Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |
| Olsen <i>et al.</i> , 2004 Historical Control Trial USA | BMI >19.8 and < 30 Any parity <26 weeks gestation N= 517 Control 359 Index n= 158 | 1) Education on healthy diet and PA in pregnancy 2) Goal setting 3) IOM guidelines for appropriate GWG used and explained to participants 4) 5x 1 page Newsletters | Health Care providers delivered all elements of intervention | Historical control Standard AN care | GWG Adherence to IOM Postpartum weight retention. | No difference in GWG No difference in rate of EGWG -Except in low income group. OW women less likely to have postpartum weight retention | No mention of theoretical underpinning Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|---|--|---|--|--|--|---|
| Phelan <i>et al.</i> , 2011 RCT USA | BMI 20 -39 Any parity 10-16 weeks gestation N= 401 <i>Control n =200</i> <i>Index n= 201</i> | (Based on Social Learning Theory) 1) Session with counsellor - given individual calorie goals emphasis on reducing high fat intake 2) Advised physical activity for 30 mins on most days (5/7) 3) 3x telephone support calls. 4) Weekly automated post cards advising on healthy diet 5) Advised on IOM GWG guidelines 6) Feedback of GWG from each clinic visit and graph of GWG. 7) If not meeting guidelines support and additional telephone call until meet guidelines | The researchers delivered all elements of intervention | Standard AN care where they received usual advice on healthy diet and were routinely weighed at each AN appointment. Sent monthly newsletter giving general maternity info and advice to aid retention. | GWG Adherence to IOM Postpartum weight retention | No difference in GWG Reduction in EGWG in normal weight women only Reduction in postpartum weight retention in all BMI groups. | Validity of pre-pregnancy weight questionable due to self report <u>Quality:</u> Risk of bias - Measures of pre-pregnancy weight questionable due to self report |
| Polley <i>et al.</i> , 2002 RCT USA | Low income women BMI 20-30 Any parity <20 weeks gestation N= 110 <i>Control n=53</i> <i>Index n= 57</i> | (Based on Social Learning Theory) 1) counselled and given literature on: healthy eating, PA, GWG, Goal setting & problem solving and self-monitoring. 2) Newsletter 3) Advised on IOM GWG guidelines 6) Feedback of GWG from each clinic visit and graph of GWG. 7) If not meeting guidelines support and additional telephone call until meet guidelines | Specially trained research staff delivered all elements of intervention | Standard AN care. | Adherence to IOM Postpartum weight retention. Dietary intake Physical activity Obstetric outcomes | Reduced EGWG amongst normal weight women No significant difference found in; postpartum weight retention, pregnancy outcomes, physical activity or dietary intake | No mention of theoretical underpinning <u>Quality</u> Risk of bias - Sequence generation and allocation concealment data not clearly described. No blinding of outcome assessors. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|---|--|---|---|--|---|--|
| Quinlivan <i>et al.</i> , 2011 RCT Australia | BMI >25 Any parity <12 weeks gestation N= 124 <i>Control n= 61</i> <i>Index n= 63</i> | 1) Brief 5 min dietary Intervention at each AN visit. 2) Continuity of carer 3) Assessment of weight at each visit 4) Assessment of mental health – depression/stress & treatment | Food technologists delivered dietary elements. The Health Care Provider gave continuity of care. Clinical psychologist assessed mental health and provided treatment where required | Standard AN care and completed baseline questionnaires on diet and physical activity levels. | GWG Raised GTT Birthweight Change in diet from first and last visit | Reduction in GWG (from 13.8 to 7k) Reduction in raised GTT No difference in birthweight change in diet – itemised log of food from previous day at each an visit by food technologist) | No mention of theoretical underpinning <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – Not adequately powered to detect reduction in GWG |
| Rosenbloom <i>et al.</i> , 2012 Historical Control Trial USA | low income women All BMI groups Any parity <20 weeks gestation N= 166 <i>Control n=109</i> <i>Index n= 57</i> | 1) Literature – Nutrition, PA and GWG guidelines + risks of EGWG Goal setting Provided with feedback by HCP re GWG and goals for exercise and diet | The Health Care Provider delivered all elements of the intervention | Historical control Standard AN care which included: Non IOM guidelines for gestational weight gain, regular recorded weighing unstructured provider advice. | GWG Adherence to IOM | Similar GWG When accounting for BMI Less likely to have EGWG | No mention of theoretical underpinning Non randomised <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias - Not adequately powered to detect reduction in GWG, Measures of pre-pregnancy weight questionable due to self report. |
| Shirazian <i>et al.</i> , 2010 Historical Cohort USA | BMI <30 Any parity ≤12 weeks gestation N=41 <i>Control n= 20</i> <i>Index n= 21</i> | 1) Educational materials- Nutrition, PA and GWG guidelines 2) Given food diary and pedometer 3) Structured group seminars On how to overcome barriers, & further educational components re diet and activity. 4) 5X one-to-one counselling sessions or telephone calls advising total gestational weight gain goals limited < 15 lbs. | Researchers delivered all components. | Historical control Standard AN care. | GWG Adherence to IOM (1990) Obstetric outcomes | Significantly less GWG in index group (average 17.86lbs as opposed to 34lbs in the control) However, majority still above guidelines No difference in obstetric outcomes | No mention of theoretical underpinning Non randomised <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – unclear as No mention of how GWG measured |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|--|--|--|--|---|--|---|
| Vinter <i>et al.</i> , 2011 RCT Denmark | BMI 30-45 Any parity 10-14 weeks gestation N= 304 <i>Control n= 154</i> <i>Index n=150</i> | 1) 4 x dietary counselling and advised to limit GWG to ≤5kg 2) Encouraged to do exercise 30 -60 mins daily -given free access to gym & pedometer -1 hour group session of moderate intensity activity and coached to increase after each session. | Dieticians delivered dietary elements and physiotherapists delivered PA elements of intervention | Standard AN care and data collected + GTT at 12-14, 28-30, 34-36 weeks Weight at each AN appointment Fitness test at recruitment & 35/40 | GWG Adherence to IOM Obstetric and neonatal outcomes Perceived improvement in diet at 35 weeks gestation. | Significantly less GWG Less EGWG- sig minority still exceeded IOM guidelines (35%) No difference in obstetric/neonatal outcomes Majority felt inclusion in study improved diet. | No mention of theoretical underpinning <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – Not adequately powered to detect differences in obstetric outcome or GWG. |
| Wolf <i>et al.</i> , 2008 RCT Denmark | BMI>25 Parity not stated ≤15 weeks gestation N= 50 <i>Control n= 27</i> <i>Index n= 23</i> | 1) 10x one hour dietetic consultation Instructed on diet composition 30 % fat, 20 % protein and 50% carbohydrates. 2) Food records allowed for individual recommendations for change. | Dieticians delivered all elements of intervention. | Standard AN care & data collection: weight, blood tests and food records at inclusion, 27 & 36 weeks. | GWG (Not IOM) Dietary intake Glucose metabolism Obstetric outcomes | Reduced GWG(half that of control) Improved dietary intake Improved glucose metabolism No negative impact on obstetric outcomes | No mention of theoretical underpinning Quality: Risk of bias - Allocation concealment data not clearly described. No blinding of outcome assessors. Other sources of bias |

1.2.1.1 Quality of intervention studies

The Cochrane Collaboration Tool for assessing risk of bias (Higgins et al., 2011) was used as the basis for assessing the internal validity of each of the intervention studies. This tool comprises six domains of bias (selection bias, performance bias, detection bias, attrition bias, reporting bias and other bias) which can be further categorised into seven sources of potential bias: Random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete data, selective reporting and anything else which is not covered elsewhere. Seven of the included studies are not randomised control trials and so random sequence generation and allocation are not applicable categories to assess quality for these papers. Also, blinding of participants and personnel is not appropriate for any of the intervention studies as it would not be possible to blind because the researchers sought to change participant behaviour. However blinding of outcome assessment would be possible, although only three studies reported this (Hui et al., 2012, Huang et al., 2011, Phelan et al., 2011). The summary of intervention studies (Table 4) contains a column on limitations and quality of studies. For clarity, only when risk of bias was identified or was deemed unclear were these recorded within the table. Appendix 2 provides further details of risk of bias for each study.

1.2.1.2 Characteristics of study populations

In the 19 trials a total 4021 participants were recruited (1805 intervention, 2219 control). Sample size varied significantly and study groups comprised anywhere between 23 and 201 participants; two studies delivered an intervention to less than 50 women (Wolff et al., 2008, Kinnunen et al., 2008).

Participants in intervention trials were recruited at varying gestations from first trimester (< 10 weeks) through to the last trimester (<26 weeks). Although intervening in the final trimester may appear to be leaving it late, it had little effect on the relative success of the intervention. Two studies did look at the gestational weight gains prior to recruitment. One which recruited at between 16-20 weeks (Mottola et al., 2010), identified that participants prior to recruitment had already experienced excessive gains (4.5kg), considerably more than the IOM guidelines (0.91kg). They were however, able to slow down the rate of gestational weight gain and during their study 80% of participants in the intervention arm were able to stay within recommended weekly ranges. Another study by Polley *et al.*, (2002) which recruited at gestations less

than 20 weeks, recognised that weight gain prior to recruitment was a strong predictor of excessive gains. Both these studies would suggest that an intervention earlier on in pregnancy may be beneficial in the prevention of excessive weight gain.

In line with the research relating to determinants of gestational weight gain, the studies identified certain risk factors either through their study design or through their results. These were: race and culture, pre-pregnancy BMI and parity.

RACE AND CULTURE

Three studies looked at interventions targeted at specific subsets of the pregnant population deemed to be at particularly high risk of excessive gestational weight gain (Gray-Donald et al., 2000, Rosenbloom et al., 2012, Polley et al., 2002). Also one study, which did not claim to target a specific subset of the population (Asbee et al., 2009) had a sample where a significant majority were of black and minority ethnic origin.

Gray-Donald and colleagues' study set in Quebec, Canada focussed on the pregnant women living in the Cree community; the indigenous Native American population of Northern Quebec (Gray-Donald et al., 2000). This particular population is known to have high rates of obesity, excessive gestational weight gain (by IOM guidelines) and postpartum weight retention as well as gestational diabetes, and thus it was felt that there was an identified need to develop an intervention to address this. Their intervention was based on Albert Bandura's social learning theory (Bandura, 1986) and aimed to educate not only the pregnant women, but the wider Cree community regarding healthy eating and physical activity during pregnancy. Participants in the index group (n=112) received an intervention delivered by nutritionists comprising individual as well as group "culturally sensitive" educational counselling sessions and the research team also delivered messages to the wider Cree community regarding healthy eating during pregnancy via radio broadcasts and pamphlets. Individual counselling sessions were focused on dietary advice and group sessions included shopping tours and cooking demonstrations. Their results found no difference in gestational weight gain, dietary intake and physical activity levels between the index and control groups. The only dietary change noted was a reduction in caffeine intake in the intervention group. When members of the community were asked as to why they thought the intervention did not work they suggested that plumpness in the community was considered attractive whereas physical activity during pregnancy was considered to be

an undesirable behaviour. It would seem that despite what the authors describe as a “culturally sensitive” approach to the intervention, educating the women and their communities on healthy eating and lifestyle during pregnancy was not enough to overcome these firmly held beliefs to assist women modify these behaviours during pregnancy.

Asbee *et al.*, (2009) conducted a randomised controlled trial in North Carolina, America to prevent excessive gestational weight gain through a combination of dietary and lifestyle counselling. The counselling in this case referred to individual counselling by dietician and their named health care provider informing and educating them regarding an appropriate lifestyle for pregnancy and individual instruction for participants regarding alterations to ensure they met guidelines for appropriate weight gain. Their sample obtained from an obstetric clinic was ethnically diverse with a large majority of participants being either Hispanic (56%) or African American (24%). The authors found that, although the intervention resulted in a reduction of the total gestational weight gain of participants, there was no difference in the number of women who exceeded IOM guidelines.

Polley and colleagues (2002) delivered a stepped-care behavioural intervention to women recruited from an antenatal clinic serving low-income women in Pittsburgh, USA. Women in the study group received both written and oral information regarding diet, activity and weight gain in pregnancy, and after each antenatal appointment were given feedback in the form of a personalised graph of their gestational weight gain. Participants were informed if their weight gain was deemed to be within healthy limits and encouraged to stay on course; for those who exceeded the recommendations, individual counselling on diet and physical activity behaviour was provided and if they continued to exceed the recommended weight gain through their pregnancy they were given increasingly structured goals. This stepped-care approach allowed the researchers to increase the intensity of the intervention dependent on need. The results of this study found that the intervention was successful in reducing the incidence of excessive gestational weight gain in women with a healthy pre-pregnancy weight, though had the opposite effect in those with a BMI >25.

Rosenbloom and colleagues (2012) also delivered an intervention to women on a low income attending a publically insured antenatal clinic in Chicago. The intervention comprised an educational pack which gave written detailed information regarding nutritional and exercise guidelines, gestational weight gain recommendations including goal setting for target weight gains. Regular feedback on dietary, exercise and weight gain goals was given during clinic appointments by the health professional responsible for their antenatal care however the authors do not give

information relating to the type of professional who was responsible. The incidence of excessive gestational weight gain as set out by IOM was less in the intervention group (37%) than the control group (50%). The numbers involved in this study are small and although the results are promising they do not provide evidence of efficacy, however the authors suggest that should a larger randomised controlled trial find the intervention successful the intervention is low cost and could easily be incorporated into the current USA maternity provision.

As already identified the social environment has a strong influence on health behaviours and the reviewed studies showed mixed results. It would seem that further research into effective interventions which are able to take account of the social environment and address cultural issues in this area are still required.

PRE-PREGNANCY BMI

Being either overweight or obese prior to pregnancy is a known risk factor for excessive gestational weight gain (Chu et al., 2009) and can further impact on the obstetric risks associated with a raised BMI. Thus there are a number of intervention studies specifically focusing on women who were classed as obese or overweight pre-pregnancy to reduce excessive gestational weight gain which have yielded mixed results.

A total of six studies identified in this review involved interventions delivered to women with a raised body mass index, two included overweight women with a BMI >25 (Mottola et al., 2010, Quinlivan et al., 2011) and four studies focused on obese women with a BMI >30 (Claesson et al., 2007, Guelinckx et al., 2010, Vinter et al., 2011, Wolff et al., 2008). All these studies, bar one (Guelinckx et al., 2010), found that the interventions reduced to some degree the total gestational weight gains of overweight and obese women in the study groups.

As discussed earlier in this chapter, in those countries that use IOM guidance regarding appropriate gestational weight gain, a risk factor for excessive weight gain is BMI >25 and, as a raised BMI is associated with an increased risk of suboptimal outcomes, high gestational weight gains further increases these risks. So it is for these reasons that the studies focused on interventions delivered to women with raised body mass index.

Three studies whose samples included differing BMI's found that the interventions were successful with some but not all BMI groups. Jeffries *et al.*, found that his study population had less gestational weight gains only in women in the overweight category but not in the other BMI categories. And two studies (Polley *et al.*, 2002, Phelan *et al.*, 2011) found their interventions were successful in reducing the number of healthy weight individuals that exceeded IOM guidelines but no significant difference was detected in other BMI categories. Interestingly Polley *et al.* (2002), found that there was a non-significant effect in the opposite direction for those women who were classed as overweight.

PARITY

Primiparity has been associated with an increased risk for gestational weight gain, yet only one study specifically targeted women pregnant with their first baby (Kinnunen *et al.*, 2007). This study delivered a relatively intense and complex intervention in early pregnancy which utilised educational elements as well as goal setting, and self-monitoring to improve diets and increase physical activity. The results of this study showed a modest improvement in the diets of participants, although they did not manage to increase the levels of physical activity undertaken nor did they reduce the number of women gaining excessive gestational weight gain. Only two other studies which recruited both parous and non-parous women looked at parity in relation to their results and had conflicting findings. One found that nulliparous women were more likely to gain excessive amounts of weight (Asbee *et al.*, 2009), whereas the other found the intervention to be most successful in reducing excessive gestational weight gain in nulliparous women (Claesson *et al.*, 2007). The authors of the latter study suggest that a possible reason for nulliparous women gaining less weight than their multiparous counterparts is they may be considered to be more inclined to adapt their lifestyle behaviours than women who have little time to spend on themselves due to the competing demands of offspring. Although an opposing view may be that women who gained large amounts of weight on a previous pregnancy may be seen to have an increased motivation to maintain a healthy lifestyle in subsequent pregnancies to avoid excessive gestational weight gain. It is therefore unclear what role parity may play in the success of an intervention designed to limit gestational weight gain.

1. 2. 1. 3 Features of interventions

The studies included in this review were designed to reduce the number of women experiencing excessive gestational weight gain through an intervention that sought to alter their behaviour; thus gestational weight gain was the primary outcome measure in all studies. The interventions varied greatly and, though nearly all had some degree of diet modification, the conduct of this element varied in its delivery, approach and intensity. Some contained both dietary and physical activity elements, whilst others focussed on just diet alone. Only one study did not contain dietary or physical activity elements and instead simply focussed on regular self-monitoring and charting of weight gain (Jeffries et al., 2009). Although this study does not specify that the intervention was aimed to alter behaviour, presumably the authors hypothesised that encouraging women to focus and monitor their weight gain in accordance with IOM guidance, would lead them to modify their lifestyle behaviours and in doing so reduce excessive weight gains. The majority of interventions included educational components and some had additional elements such as follow-up telephone calls, literature, group exercise and food and activity diaries or logs etc.

Many of the studies included counselling as part of the intervention, although the counselling appears to differ from study to study. Some describe counselling as a means to educate women by simply providing information on recommendations (Asbee et al., 2009, Hui et al., 2012, Mottola et al., 2010, Vinter et al., 2011). Others suggest counselling is more than just information giving, and include the provision of psychological techniques for recognising and modifying behavioural elements to eating and physical activity (Guelinckx et al., 2010, Kinnunen et al., 2008). One used interactive video counselling in which the authors report that a 'video doctor' provided education on dietary and physical activity recommendations utilising Motivational Interviewing through reflexive non-judgemental counselling (Jackson et al., 2011). With such varied meaning given to the term 'counselling', it is difficult to draw conclusions regarding its efficacy in those studies that used this element in their intervention.

The amount of participant burden varied from study to study, with some interventions having minimal levels of intensity and requiring little time and effort on the part of the individual, whilst others required much more from their participants. For example one study simply requested that participants weigh themselves regularly and record their weight gain on a chart (Jeffries et al., 2009). Whereas another required participants to attend ten dietetic consultations lasting an hour each time as well as blood tests and self-report weighed food records at three time points

(Wolff et al., 2008). The degree of participant burden may then influence the sample, as only highly motivated respondents are likely to commit to research that requires so much from them and therefore this can lead to possible selection bias. It may also be that in simply giving an individual significantly more attention with the purpose of improving their health behaviours, may impact upon the behaviour irrespective of the methods used.

The personnel responsible for the delivery of the interventions varied greatly from study to study, with some using researchers to deliver it (Polley et al., 2002), whilst others used a multidisciplinary approach (Vinter et al., 2011, Mottola et al., 2010, Quinlivan et al., 2011). Only one study specifically referred to the use of midwives to deliver aspects of the intervention (Claesson et al., 2007). Other studies referred to the health care provider delivering some aspects though do not give further explanation as to the profession of the provider. Half the studies used dieticians or nutritionists to deliver the dietary components and two studies used physiotherapists for the physical activity elements. Eliciting behaviour change with regards to physical activity, was mostly done through educating and encouraging women to participate in exercise, some studies provided further support with this in terms of group exercise classes (Claesson et al., 2007, Gray-Donald et al., 2000, Hui et al., 2012, Vinter et al., 2011), and by providing pedometers (Vinter et al., 2011, Mottola et al., 2010).

It has been suggested that interventions designed to modify lifestyle behaviours should have, and make explicit reference to, theoretical underpinning (NICE, 2007, Davidson et al., 2003), and the Medical Research Council also clearly state that theory should be used in the development and evaluation of complex intervention (MRC, 2008). The reason for this is that the literature relating to behaviour change indicates that interventions based on theory have been found to be more effective (Thirlaway and Upton, 2009). Only three studies explicitly stated the behavioural theories behind the development of the intervention, two of which used Social Learning Theory based on the work of Albert Bandura (Gray-Donald et al., 2000, Phelan et al., 2011). Social Learning theory is derived from the concept that individuals learn within a social environment, and is more commonly used in the field of education and will be discussed in more detail on page 61. By utilising social learning theory, the authors imply that an intervention which delivers patient education may be sufficient in improving health behaviours. Both studies (Gray-Donald et al., 2000, Phelan et al., 2011) were unable to provide support that their intervention programmes were able to reduce gestational weight gain. Indeed Jackson and colleagues (2011) whose study also contained educational components testify that increased knowledge alone is not enough to generate behaviour modification in pregnant women. If indeed, education and increasing knowledge of the

risks associated with certain lifestyle behaviours was enough to provoke change, it would suggest that all pregnant women would be non-smokers who ate well balanced healthy meals and exercised frequently. But this is not the case, and reasons for behaviour are more complex than simply due to a lack of knowledge with regards to risk.

Kinnunen *et al.*, (2007) used a Finnish behavioural counselling model developed to encourage physical activity in the non-pregnant population (Laitakari and Asikainen, 1998). This model incorporates known effective behavioural strategies and applies them to assist counsellors. Kinnunen and colleagues also adapted this model for the dietary elements of the intervention programme. This study did not show that the programme of intervention had any effect on gestational weight gain. All three studies that state they used theory in the development of the interventions, however, they did not clarify how these theories were used and all were unsuccessful in preventing excessive weight gain. It is difficult to draw conclusions from this given the lack of clarity as to how the theories were utilised.

Behavioural change techniques from the field of psychology have been widely used in the majority of the intervention studies, the most popular of which was goal setting which was used by all the studies (see Table 5 page 43).

Some interventions had generic goals, for example weight gain goals using IOM guidance stratified on BMI, others were more personalised and adapted to the individuals own lifestyle and to their dietary and physical activity needs. Providing this sort of tailoring to individual needs is recognised as key to the success of behavioural interventions (Kreuter and Skinner, 2000, Kreuter and Strecher, 1996) and as a result is included as a recommendation in UK national guidance on behaviour change (NICE, 2007). Indeed, a recently published systematic review investigating goal setting strategies in interventions to prevent gestational weight gain concluded that incorporating goal setting into interventions appeared to be useful in assisting women to manage their weight gain (Brown *et al.*, 2012).

A number of studies had self-monitoring built in to their intervention and some provided participants with feedback regarding their performance. Motivational Interviewing (MI) was used by a couple of studies, and this technique which has become popular in recent years, elicits from individuals their own motivations for altering behaviour to improve their health. This technique is explored in greater detail in CHAPTER 4 (page 168). In one study the Motivational Interviewing was carried out by midwives specifically trained in MI techniques (Claesson *et al.*, 2007). Interestingly the other study to use MI as an aspect of the intervention delivered it via a 'video doctor'; an actor that advises and educates

individuals on diet, exercise and nutrition based on the principles of MI. However it is difficult to see how a pre-recorded video computer programme would be able to adhere to the principles of Motivational Interviewing as central to its application is the collaborative relationship between counsellor and client which permits joint decision making (Miller and Rollnick, 2002). One could argue that a pre-recorded video message would be unable to adequately 'listen' to the client and would provide a pre-determined rather than an individualised response, and therefore seems at odds to the principles of MI.

Table 5 Behaviour change used in intervention studies

| | Goal setting | | Self-monitoring | Feedback of performance | Re-evaluate goals | Psychological counselling techniques |
|-----------------------------|--------------|----------|-----------------|-------------------------|-------------------|--------------------------------------|
| | Generic | Tailored | | | | |
| Asbee <i>et al.</i> , | X | | | X | | |
| Claesson <i>et al.</i> , | X | | | | | X |
| Guelinckx <i>et al.</i> , | X | | | X | | |
| Gray Donald <i>et al.</i> , | X | | | | | |
| Huang <i>et al.</i> , | | X | X | X | X | |
| Hui <i>et al.</i> , | | X | X | | | |
| Jackson <i>et al.</i> , | | X | | | | X |
| Jeffries <i>et al.</i> , | X | | X | | | |
| Kinnuen <i>et al.</i> , | X | | X | | | |
| Mottola <i>et al.</i> , | X | | X | | | |
| Olsen <i>et al.</i> , | | X | X | | | |
| Phelan <i>et al.</i> , | | X | | X | X | |
| Polley <i>et al.</i> , | | X | | X | X | |
| Quinlivan <i>et al.</i> , | | X | | X | | |
| Rosenbloom <i>et al.</i> , | | X | | X | | |

| | | | | | | |
|---------------------------|----------|----------|----------|--|----------|--|
| Shirazian <i>et al.</i> , | X | | X | | | |
| Vinter <i>et al.</i> , | X | | X | | | |
| Wolf <i>et al.</i> , | | X | X | | X | |

1. 2. 1. 4 Outcome measures

WEIGHT GAIN

In the studies, gestational weight gain is calculated by subtracting a baseline weight from a final weight measurement, though the timing and method for obtaining both these measurements varies greatly (see Table 6) . Of those studies that reported how baseline measurements were obtained, a significant number used self-reported measures of pre-pregnancy weight, and although the final weight would be objectively measured by health professionals, the pre-pregnancy weight as a self-report may be less reliable. Phelan *et al.*, (2011) cognisant of the possible limitation of using self-report to obtain pre-pregnancy weight, assessed its validity amongst their participants. They were able to check self-report measurements against clinician recorded weight in the year prior to pregnancy, through medical records. They found a strong correlation between self-report and clinician measured weight and as such suggest self-report to be a valid and accurate indication of pre-pregnancy weight.

Table 6 Variation in calculating pregnancy weight gain at term

| Gestational weight gain (GWG) measurement | Studies |
|---|--|
| GWG= (weight at last antenatal check-up) minus (weight at first antenatal check-up) | Claesson <i>et al.</i> , 2007., Grey-Donald <i>et al.</i> , 2000., Olson <i>et al.</i> , 2004., Rosenbloom <i>et al.</i> , 2012. |
| GWG= (weight on day of birth) minus (baseline self-report pre-pregnancy weight) | Asbee <i>et al.</i> , 2009., Guelinckx <i>et al.</i> , 2010., Jackson <i>et al.</i> , 2011. |
| GWG = (weight at 36 weeks gestation) minus (weight at first antenatal check-up) | Jeffries <i>et al.</i> , 2009., Mottola <i>et al.</i> , 2010. |
| GWG= (weight at last antenatal check)-up minus (self-report pre-pregnancy weight) | Phelan <i>et al.</i> , 2011., Polley <i>et al.</i> , 2002 |

| | |
|--|---|
| GWG = Does not state how or when GWG was measured. | Huang <i>et al.</i> , 2011. Shirazian <i>et al.</i> , 2010 |
| GWG = (weight on day of birth) minus (baseline pre-pregnancy) NB Does not state how baseline obtained | Hui <i>et al.</i> , 2012. |
| GWG= (weight on day of birth) minus (weight at first antenatal check-up) | Quinlivan <i>et al.</i> , 2011. |
| GWG = (weight at 35 weeks gestation) minus (weight measured at inclusion) | Vinter <i>et al.</i> , 2011. |
| GWG = (weight at 36 weeks gestation) minus (weight measured at inclusion) | Wolff <i>et al.</i> , 2008. |

Some studies used weight measurement at the point of inclusion in the study instead of pre-pregnancy as the baseline weight (Wolff *et al.*, 2008, Vinter *et al.*, 2011), whereas others do not state how or when baseline weight measurement was calculated (Hui *et al.*, 2012) and two studies do not state how gestational weight gain was obtained (Huang *et al.*, 2011, Shirazian *et al.*, 2010). The majority of studies reported that they used final weight measurements obtained by a health professional, although the timing of this fluctuated from 35 weeks gestation through to weight measured at onset of labour. This could be as much as 6 weeks variation in timing of final weight measurements.

Although gestational weight gain may at first appear to be an objective measurement and therefore a reliable outcome measure, the variation in methods used to assess weight gained during pregnancy make the interpretation of results less than clear cut.

Most of the studies (n=15) used the Institute of Medicine guidelines for appropriate gestational weight gain classified by BMI category to determine whether weight gain was within the recommended limits, however four studies did not (see Table 4 Summary of intervention studies

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|--|---|--|--|--|---|--|
| Asbee <i>et al.</i> , 2009 RCT | All BMI groups Any parity 79% Hispanic | 1) Counselling on diet- advised caloric value – 40% carbohydrates, 30% protein 30% fats. 2) Instructed to engage in moderate | Dietician- dietary advice HCP- advised on PA and GWG. | Standard AN care this included standard literature on diet and exercise in | GWG= weight on day of birth minus baseline self-report pre-pregnancy | Less GWG in study group. No sig difference in adherence of IOM | No mention of theoretical underpinning <u>Quality:</u> Risk of Bias – No blinding of outcome assessors, unclear whether incomplete |

| | | | | | | | |
|--|---|---|---|---|---|--|--|
| USA | /African American. < 16 weeks gestation N=100 Control n=43 Index n=57 | intensity exercise at least 3/7 preferably 5/7 3) Advised on IOM guidelines and weighed at each visit 4) Participants instructed to alter lifestyle according to gestational weight gain | Monitored GWG. | pregnancy. Weight measured at each A/N appointment | Adherence to IOM Obstetric outcomes | guidelines., No difference in obstetric outcomes | outcome data were addressed. Other sources of bias - Unable to achieve predetermined power. Measures of pre-pregnancy weight questionable due to self report. |
| Claesson <i>et al.</i> , 2007 Non RCT Sweden | BMI >30 Any parity 10-12 weeks gestation N=348 Control n=193 Index n=155 | 1) Assessment of knowledge and then Educated as to risks of excessive gestational weight gain 2) Invited to 30 min once a week of weight control and supportive talk 3) Invited to attend aqua aerobics 1-2 per week 4) MI used to change behaviour | Midwife delivered all components of intervention | Standard AN care | GWG= weight at last Antenatal check-up minus weight at first Antenatal check-up Guideline of < 7kg Mode of birth and neonatal outcome | Less GWG in study group. Higher percentage gained <7kg No difference in mode of birth or neonatal outcome. | Non randomised No mention of theoretical underpinning <u>Quality:</u> Risk of bias – No blinding of outcome assessors unclear whether incomplete outcome data were addressed Not adequately powered to detect differences in obstetric outcome. |
| Gray Donald <i>et al.</i> , 2000 Time series control trial Canada | Cree community All BMI groups Any parity <26 weeks gestation N= 219 Control n= 107 Index n= 112 | 1) Approx x4 Individual Dietary advice sessions to increase fruit and vegetable intake and decrease ED foods 2) Radio broadcasts about healthy eating in pregnancy 3) literature about diet in pregnancy 4) Shopping tours & Cooking demos. 5) Exercise walking groups offered 6) Encouraged to stay with IOM guidelines | Nutritionist delivered all components of intervention and worked alongside the Health Care Providers. | Standard AN care in same community 7 months prior to intervention | GWG Dietary intake Plasma glucose levels | No difference in GWG No difference in dietary intake No difference in glucose levels | Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|------------------------------------|---|---|------------------|--|--|--|
| Guelinckx <i>et al.</i> , 2010 RCT | BMI >29 Any parity <15 weeks | Passive group - given literature on 1) nutrition 2) PA. | Health Care Provider gave out literature. | Standard AN care | GWG= weight on day of birth minus baseline self-report pre-pregnancy | No difference in GWG No difference in adherence to IOM | No mention of theoretical underpinning <u>Quality:</u> Risk of bias - No blinding of outcome |

| | | | | | | | |
|--|---|--|--|---|--|---|---|
| Belgium | <p>gestation</p> <p>N= 195</p> <p>Control n= 65</p> <p>Passive n=65</p> <p>Index n=65</p> | <p>Index group</p> <p>1) 3x one hour group counselling. (5 women per group)</p> <p>2) Energy intake not restricted but advised to swap ED foodstuffs with healthy alternatives</p> <p>3) PA literature provided</p> <p>4) If exceeded IOM guidelines advised to limit ED foods</p> | <p>Nutritionist delivered all components of intervention to index group</p> | | <p>Adherence to IOM</p> <p>Dietary intake</p> <p>Physical activity</p> <p>Obstetric + neonatal outcomes</p> | <p>Improvement in dietary intake in both passive and index groups.</p> <p>No change in PA</p> <p>No difference in neonatal outcome</p> | <p>assessors. Sequence generation and allocation concealment data not clearly described. Unclear whether incomplete outcome data were addressed</p> <p>Other sources of bias- measures of pre-pregnancy weight questionable due to self report Not adequately powered to detect differences in obstetric outcome.</p> |
| <p>Huang <i>et al.</i>, 2011</p> <p>RCT</p> <p>Taiwan</p> | <p>All BMI Groups</p> <p>Any parity</p> <p><16 weeks gestation</p> <p>N= 125</p> <p>Control n=64</p> <p>Index n=61</p> | <p>1) 6x meeting with trained HCP who made an individual dietary and PA plan.</p> <p>2) Goal setting</p> <p>3) GWG goal setting</p> <p>4) If not meeting guidelines support and additional dietary and PA goal setting</p> | <p>A trained nurse specialist delivered all components of the intervention</p> | <p>Standard AN care this included routine lit of eating and exercise in pregnancy as well as x3 educational programme for pregnant women (once a trimester)</p> | <p>GWG</p> <p>Total recommended GWG 10-14kg</p> <p>Change in dietary and PA behaviour</p> <p>Scores for :</p> <p>Depression</p> <p>Perceived social support</p> <p>Self-efficacy</p> <p>Body image</p> | <p>Mean GWG higher than recommended but still sig lower than control group.</p> <p>+ve Changes in both dietary and PA behaviour</p> <p>Improved scores for:</p> <p>Depression</p> <p>Perceived of social support</p> <p>Self-efficacy</p> <p>Body image - during pregnancy but not in PN period..</p> | <p>No mention of theoretical underpinning</p> <p><u>Quality:</u></p> <p>Risk of bias – allocation concealment not clearly described. Unclear whether incomplete outcome data were addressed</p> <p>Other sources of bias – unclear as no mention of how GWG measured</p> |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|--|--|--|---|--|---|---|
| Hui <i>et al.</i> , 2012 RCT Canada | All BMI groups Parity not recorded <26 weeks gestation N=190 Control n= 88 Index n= 102 | 1) 2x Personalised dietary counselling after food frequency assessment. 2) Advised and assisted exercise regime of: 3-5 a week for 30 mins. – group sessions and home 3 day food diary and physical activity questionnaire at baseline and 2 months after recruitment | Dietician delivered dietary counselling. Researchers gave info re: PA | Standard AN care this included routine lit of eating and exercise in pregnancy 3 day food diary and physical activity questionnaire at baseline and 2 months after recruitment | GWG Adherence to IOM Food intake Physical activity | No sig different in GWG Reduced incidence of EGWG Improved PA Improved diet | No mention of theoretical underpinning <u>Quality:</u> Risk of bias – Unclear whether incomplete outcome data were addressed |
| Jackson <i>et al.</i> , 2011 RCT USA | All BMI groups Any parity 26 weeks gestation N = 287 Control n=153 Index n= 134 | 1) Computerised video counselling following behavioural assessment at recruitment and 4/52 afterwards 2) Education based on MI Intervention comprised; Counselling session video 3) Cue sheet for clinician 4) Educational worksheet | Video doctor gave counselling. Health Care Provider was given cue sheet to support counselling session. | Standard AN care and at recruitment and 4/52 weeks afterwards computerised behavioural assessment. – including self-report weight, height, food intake, exercise habits, knowledge of healthy eating in pregnancy | GWG Adherence to IOM Dietary intake Physical activity satisfaction with video counselling | No difference in GWG Same number of EGWG Improvement in diet Improvement in activity 98% satisfaction with counselling | No mention of theoretical underpinning Validity of pre-pregnancy weight questionable due to self report <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |
| Jeffries <i>et al.</i> , 2009 RCT Australia | All BMI groups Any parity <14 weeks gestation N= 236 Control n= 111 Index n=125 | 1) Weight gain to within IOM guidelines. – 2) Regular weighing by participants 3) Recording on individual chart | Researchers gave participants chart and asked them to self-monitor their weight and mark on chart. | Standard AN care Weighed at recruitment and at 36 weeks gestation. But not advised on GWG | GWG Adherence to IOM Obstetric outcomes | Less GWG in overweight <u>but not</u> obese women. Slightly reduced incidence of EGWG No significant differences in obstetric outcome | No mention of theoretical underpinning <u>Quality:</u> Risk of bias - Unclear whether incomplete outcome data were addressed. Other sources of bias – not adequately powered to detect difference in obstetric outcome. |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|--|--|---|--|---|--|---|
| Kinnunen <i>et al.</i> , 2007 Non RCT Finland | All BMI groups Primiparous only 8-9 weeks gestation N= 105 Control n=56 Index n= 49 | 1) X3 counselling sessions to improve diet. (3 meals a day, fruit and vegetables, increased fibre, restrict sugar intake) 2) X 5 counselling session to achieve PA 30 mins 5 days a week Goal setting PA & Diet record kept 3) Literature to take home 4) IOM guidelines for appropriate GWG used and explained to participants | Public Health Nurse delivered all elements of intervention | Standard AN care This included: brief advice giving on diet, activity and weight gain (not IOM) | GWG Adherence to IOM Physical activity Dietary intake | No difference in GWG No difference in rate of EGWG No difference in levels of PA Some improvement in diet- fruit and fibre intake | Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed Other sources of bias – not adequately powered to detect reduction in GWG |
| Mottola <i>et al.</i> , 2010 Historical Control Trial Canada | BMI> 25 Any parity 16-20 weeks gestation N= 325 Control n=260 Index n=65 | 1) Counselling x1 regarding diet: Keep 1 day food diary per week Calories limited to 2000/day Diet breakdown Carbohydrates 40-50% Fat 30% Protein 20-30% 2) Walking 3-4x week @25 mins building up to 40 mins& Advised target to increase HR. 3) Pedometer | Dietician delivered dietary advice/counselling Kinesiologist delivered physical activity elements of intervention. | Historical control matched for birth outcomes only Standard AN care | GWG Adherence to IOM Energy intake Physical activity Post-partum weight retention. Birth outcomes | Reduced risk of weekly EGWG during intervention however participants had EGWG prior to commencing study and therefore mean GWG for entire pregnancy was over IOM guidelines. Reduced caloric intake & Increased physical activity. No difference in birth outcomes | No mention of theoretical underpinning Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |
| Olsen <i>et al.</i> , 2004 Historical Control Trial USA | BMI >19.8 and < 30 Any parity <26 weeks gestation N= 517 Control 359 Index n= 158 | 1) Education on healthy diet and PA in pregnancy 2) Goal setting 3) IOM guidelines for appropriate GWG used and explained to participants 4) 5x 1 page Newsletters | Health Care providers delivered all elements of intervention | Historical control Standard AN care | GWG Adherence to IOM Postpartum weight retention. | No difference in GWG No difference in rate of EGWG -Except in low income group. OW women less likely to have postpartum weight retention | No mention of theoretical underpinning Non randomised <u>Quality:</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|--|---|--|---|--|--|--|---|
| Phelan <i>et al.</i> , 2011 RCT USA | BMI 20 -39 Any parity 10-16 weeks gestation N= 401 <i>Control n =200</i> <i>Index n= 201</i> | (Based on Social Learning Theory) 1) Session with counsellor - given individual calorie goals emphasis on reducing high fat intake 2) Advised physical activity for 30 mins on most days (5/7) 3) 3x telephone support calls. 4) Weekly automated post cards advising on healthy diet 5) Advised on IOM GWG guidelines 6) Feedback of GWG from each clinic visit and graph of GWG. 7) If not meeting guidelines support and additional telephone call until meet guidelines | The researchers delivered all elements of intervention | Standard AN care where they received usual advice on healthy diet and were routinely weighed at each AN appointment. Sent monthly newsletter giving general maternity info and advice to aid retention. | GWG Adherence to IOM Postpartum weight retention | No difference in GWG Reduction in EGWG in normal weight women only Reduction in postpartum weight retention in all BMI groups. | Validity of pre-pregnancy weight questionable due to self report <u>Quality:</u> Risk of bias - Measures of pre-pregnancy weight questionable due to self report |
| Polley <i>et al.</i> , 2002 RCT USA | Low income women BMI 20-30 Any parity <20 weeks gestation N= 110 <i>Control n=53</i> <i>Index n= 57</i> | (Based on Social Learning Theory) 1) counselled and given literature on: healthy eating, PA, GWG, Goal setting & problem solving and self-monitoring. 2) Newsletter 3) Advised on IOM GWG guidelines 6) Feedback of GWG from each clinic visit and graph of GWG. 7) If not meeting guidelines support and additional telephone call until meet guidelines | Specially trained research staff delivered all elements of intervention | Standard AN care. | Adherence to IOM Postpartum weight retention. Dietary intake Physical activity Obstetric outcomes | Reduced EGWG amongst normal weight women No significant difference found in; postpartum weight retention, pregnancy outcomes, physical activity or dietary intake | No mention of theoretical underpinning <u>Quality</u> Risk of bias - Sequence generation and allocation concealment data not clearly described. No blinding of outcome assessors. Other sources of bias - Measures of pre-pregnancy weight questionable due to self report |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|---|--|---|---|--|---|--|
| Quinlivan <i>et al.</i> , 2011 RCT Australia | BMI >25 Any parity <12 weeks gestation N= 124 <i>Control n= 61</i> <i>Index n= 63</i> | 1) Brief 5 min dietary Intervention at each AN visit. 2) Continuity of carer 3) Assessment of weight at each visit 4) Assessment of mental health – depression/stress & treatment | Food technologists delivered dietary elements. The Health Care Provider gave continuity of care. Clinical psychologist assessed mental health and provided treatment where required | Standard AN care and completed baseline questionnaires on diet and physical activity levels. | GWG Raised GTT Birthweight Change in diet from first and last visit | Reduction in GWG (from 13.8 to 7k) Reduction in raised GTT No difference in birthweight change in diet – itemised log of food from previous day at each an visit by food technologist) | No mention of theoretical underpinning <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – Not adequately powered to detect reduction in GWG |
| Rosenbloom <i>et al.</i> , 2012 Historical Control Trial USA | low income women All BMI groups Any parity <20 weeks gestation N= 166 <i>Control n=109</i> <i>Index n= 57</i> | 1) Literature – Nutrition, PA and GWG guidelines + risks of EGWG Goal setting Provided with feedback by HCP re GWG and goals for exercise and diet | The Health Care Provider delivered all elements of the intervention | Historical control Standard AN care which included: Non IOM guidelines for gestational weight gain, regular recorded weighing unstructured provider advice. | GWG Adherence to IOM | Similar GWG When accounting for BMI Less likely to have EGWG | No mention of theoretical underpinning Non randomised <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias - Not adequately powered to detect reduction in GWG, Measures of pre-pregnancy weight questionable due to self report. |
| Shirazian <i>et al.</i> , 2010 Historical Cohort USA | BMI <30 Any parity ≤12 weeks gestation N=41 <i>Control n= 20</i> <i>Index n= 21</i> | 1) Educational materials- Nutrition, PA and GWG guidelines 2) Given food diary and pedometer 3) Structured group seminars On how to overcome barriers, & further educational components re diet and activity. 4) 5X one-to-one counselling sessions or telephone calls advising total gestational weight gain goals limited < 15 lbs. | Researchers delivered all components. | Historical control Standard AN care. | GWG Adherence to IOM (1990) Obstetric outcomes | Significantly less GWG in index group (average 17.86lbs as opposed to 34lbs in the control) However, majority still above guidelines No difference in obstetric outcomes | No mention of theoretical underpinning Non randomised <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – unclear as No mention of how GWG measured |

| STUDY | SAMPLE | INTERVENTION | DELIVERY | CONTROL | MEASURES | RESULTS | LIMITATIONS/QUALITY* (*Adapted from Higgins & Altman 2011) |
|---|--|--|--|--|---|--|---|
| Vinter <i>et al.</i> , 2011 RCT Denmark | BMI 30-45 Any parity 10-14 weeks gestation N= 304 <i>Control n= 154</i> <i>Index n=150</i> | 1) 4 x dietary counselling and advised to limit GWG to ≤5kg 2) Encouraged to do exercise 30 -60 mins daily -given free access to gym & pedometer -1 hour group session of moderate intensity activity and coached to increase after each session. | Dieticians delivered dietary elements and physiotherapists delivered PA elements of intervention | Standard AN care and data collected + GTT at 12-14, 28-30, 34-36 weeks Weight at each AN appointment Fitness test at recruitment & 35/40 | GWG Adherence to IOM Obstetric and neonatal outcomes Perceived improvement in diet at 35 weeks gestation. | Significantly less GWG Less EGWG- sig minority still exceeded IOM guidelines (35%) No difference in obstetric/neonatal outcomes Majority felt inclusion in study improved diet. | No mention of theoretical underpinning <u>Quality</u> Risk of bias - No blinding of outcome assessors. Unclear whether incomplete outcome data were addressed. Other sources of bias – Not adequately powered to detect differences in obstetric outcome or GWG. |
| Wolf <i>et al.</i> , 2008 RCT Denmark | BMI>25 Parity not stated ≤15 weeks gestation N= 50 <i>Control n= 27</i> <i>Index n= 23</i> | 1) 10x one hour dietetic consultation Instructed on diet composition 30 % fat, 20 % protein and 50% carbohydrates. 2) Food records allowed for individual recommendations for change. | Dieticians delivered all elements of intervention. | Standard AN care & data collection: weight, blood tests and food records at inclusion, 27 & 36 weeks. | GWG (Not IOM) Dietary intake Glucose metabolism Obstetric outcomes | Reduced GWG(half that of control) Improved dietary intake Improved glucose metabolism No negative impact on obstetric outcomes | No mention of theoretical underpinning <u>Quality:</u> Risk of bias - Allocation concealment data not clearly described. No blinding of outcome assessors. Other sources of bias |

). Wolff *et al.*, (2008) shunned the 1991 IOM guidance as they considered that the lack of upper limit for obese women would only serve to further increase obesity and thereby health risks and so instead gave a target range of between 6-7kg. Cleasson *et al.*, (2007) went further and did not provide a minimum; rather they aimed to limit gestational weight gain in obese women to under 7kg. A recent Taiwanese study (Huang *et al.*, 2011) did not use recommendations stratified by BMI instead they used the Taiwanese Department of Health range of between 10-14kg for all BMI groups. And an Australian paper by Quinlivan *et al.*, (2011) did not specify target weight gains for obese women instead they assessed the efficacy of their intervention in reducing gestational weight gain through comparing the weight gains of both the index and control group. All four of these studies report that they were successful in limiting gestational weight gain when comparisons were drawn between the study and control groups though they did not necessarily manage to limit the weight gain to within the researchers' set target.

BEHAVIOUR CHANGE

All the studies assessed behavioural interventions to reduce gestational weight gain, whether that was through dietary or physical activity modification. However, several of the studies did not provide further information on whether the intervention had been successful in altering women's behaviour and only looked at gestational weight gain as the outcome measure. For instance Phelan *et al.*, (2011) looked at a multifaceted intervention that sought to improve women's eating and physical activity behaviour. This study was based on the original smaller study conducted by Polley *et al.*, (2002) which has also been included in this review. Phelan and colleagues measured gestational weight gain, adherence to IOM guidelines and also postpartum weight retention. They did not look to see if the intervention was successful in changing either physical activity or dietary behaviours. Their results showed limited success, managing to reduce the number of women with excessive gestational weight gain in the healthy weight category only. There was no impact on pregnancy weight gain for overweight or obese women. Interestingly the original study by Polley *et al.*, (2002) did look at behaviour change through self-report and found that no alterations in either physical activity nor eating behaviours related to pregnancy weight gain or exceeding the IOM guidelines. The authors acknowledge that this may be due to the difficulty in obtaining accurate and valid measures.

Another study that contained only dietary elements to the intervention assessed changes in dietary intake and found that unlike the Polley *et al.*, study, improvements in dietary intake was positively related to gestational weight gain (Wolff *et al.*, 2008). Dietary intake in this study was assessed through 7-day weighed food records and it may be that this more intensive assessment assisted women in their self-monitoring and their regulation and adherence to dietary recommendations. This method for collecting data on dietary intake was seen as the gold standard (Medical Research Council, 2012), however there has been some debate regarding the accuracy of weighed food records as a form of data collection as under-reporting is known to be common (Livingstone *et al.*, 1990), and its use corresponds with a high respondent burden (Wrieden *et al.*, 2003).

The reliance on gestational weight gain as the primary outcome measure is likely to be due the fact that it is considered to be an objective measurement and not subject to bias unlike behaviour change which for the majority of instances is measured by self-report. However, it should be noted that the use of pedometers can provide an objective measurement for physical activity. Of the two studies that used pedometers (Vinter *et al.*, 2011, Mottola *et al.*, 2010), only one reported the step counts pre and post intervention. Mottola *et al.*, (2010) found that the intervention was successful in increasing activity with participants moving from a 'low active' classification to an 'active' category according to their daily step count by the end of their intervention programme.

All studies sought to measure efficacy of the interventions and were in essence seeking to intervene to alter lifestyle behaviours. But only one study reported that they collected data on psychological constructs of behaviour change. The research by Huang, Yeh and Tsai (2011) conducted in Taiwan looked at psychosocial aspects of lifestyle behaviours. This study assessed the efficacy of an intervention not only through changes in maternal body weight but also five other outcome indicators through validated psychometric scales. Their results showed that women in the intervention arm not only had significantly less gestational weight gain but had better scores in health-promoting behaviour, self-efficacy, attitude towards body image, depression and perceived social support. The educational intervention delivered to the Taiwanese women comprised six one to one counselling sessions with a trained nurse, the first session lasting approximately 30-40 minutes, and then 5 subsequent booster sessions. These counselling sessions included personalised goal setting and feedback of performance, re-evaluation of set goals as well as providing supporting educational literature. The interventions impact on gestational weight gain and self-efficacy is

encouraging, and may explain why participants had a more positive view of their body image and perhaps less depressive symptoms as a result. But interestingly the intervention was not designed to promote existing social support mechanisms; rather the authors suggest that the regular meetings with the nurse acted to bolster participants and thus boosted women's perception of social support. The influence of significant others can have considerable impact into the views and behaviours of individuals (Thornton et al., 2006), yet only one study utilised this through a wider community educational programme (Gray-Donald et al., 2000).

1. 2. 1. 5 Efficacy of interventions

The efficacy of interventions within the research papers varied greatly (see table 4) with five demonstrating little to no impact on gestational weight gain (Guelinckx et al., 2010, Gray-Donald et al., 2000, Hui et al., 2012, Kinnunen et al., 2007, Rosenbloom et al., 2012), whilst four were more successful in some subsets of their sample (Jeffries et al., 2009, Olson et al., 2004, Phelan et al., 2011, Polley et al., 2002) and a total of eight demonstrating significantly less gestational weight gain in their index group (Huang et al., 2011, Claesson et al., 2007, Asbee et al., 2009, Mottola et al., 2010, Quinlivan et al., 2011, Shirazian et al., 2010, Vinter et al., 2011, Wolff et al., 2008).

Of the six studies that were found to be ineffective in reducing gestational weight gain, four reported to be successful in positively altering lifestyles, with improvements seen in participants' diets and their activity levels. It may be that the lifestyle changes were too minor to impact upon weight gain although this finding could be seen to provide evidence that excessive gestational weight gain in these participants may not solely be due to the modifiable behaviours, of diet and physical activity.

Two studies did not report on any behaviour change (Rosenbloom et al., 2012). Only one of the 18 studies included in this review found absolutely no change following delivery of the intervention to either weight gain, diet or physical activity (Gray-Donald et al., 2000). As previously noted the reason for this lack of effect may have been that the Cree community that they chose to target, had very specific cultural values where plumpness is seen as a desirable trait, and exercise is seen as unattractive. Both these values are not necessarily applicable to other cultures in the western world.

It is evident that pregnancy is considered an important time for intervening to reduce excessive weight gain and reduce incidence of obesity, however, the research papers identified in this review do not give clear indication as to the most appropriate methods.

Interestingly only two papers appeared to investigate participant perception of efficacy of intervention, though it is possible that some did carry out participant evaluation of interventions but chose not to report the findings. The paper by Jackson *et al.*, (2011) reports that 98% of their participants were satisfied with the video counselling and although they were unable to demonstrate that their intervention was effective in reducing gestational weight gain, participants did report improvements in their dietary and physical activity behaviours. Participants in the study by Vinter *et al.*, (2011) were asked whether they felt inclusion improved their diet and the majority felt that it had. In Sweden, Claesson and colleagues published a follow-up paper on consumer satisfaction with their intervention where they interviewed a total of 56 participants (Claesson *et al.*, 2008). They found that the majority of women were satisfied and would attend the programme if they became pregnant again. They also identified that the programme not only influenced the diets and activity behaviours of participants, but also that this influence appeared to positively affect the health behaviours of the woman's own family.

Obtaining participants' views and opinion of interventions should be a priority for researchers, as efficacy may depend upon how the intervention is viewed by those who receive it. In other words, acceptability of interventions may be an important factor in their success and sustainability. Within maternity, woman-centred care is recognised as the gold standard, and it is recommended that when developing care practises including strategies for enabling healthy lifestyles, midwives should actively involve women (Royal College of Midwives, 2008).

The diversity in aspects of the trials such as differences in: the sample population, delivery, timing and intensity of components of the interventions, and methods of data collection make it difficult to draw conclusions as to why some were successful and others were less so. And this lack of uniformity or heterogeneity has been identified in a number of systematic reviews of trials aimed to reduce gestational weight gain (Gardner *et al.*, 2011, Dodd *et al.*, 2010, Herring *et al.*, 2011, Ronnberg and Nilsson, 2010, Brown *et al.*, 2012).

Complex interventions are used frequently within the health sector and these interventions usually comprise several different components. The nature of these complex interventions makes evaluating their efficacy particularly difficult as it can be unclear which components may be viewed as the 'active ingredients' within the intervention. The MRC recognise the difficulties in the development and evaluation of such interventions and in response provide a clear framework to assist researchers (MRC, 2008).

1. 2. 1. 6 Summary

Obesity in the general population is a highly topical subject area with much political and media interest due to its increasing prevalence and associated co morbidities. This has also been seen within the pregnant population and is known to be a risk factor for poor obstetric, maternal, fetal and neonatal outcomes. Pregnancy is also seen as a time when women are particularly susceptible to the development of overweight and obesity with some subsets of the pregnant population being especially vulnerable to excessive weight gain. Gestational weight gain is the result of a combination of factors relating to not just the physiology of pregnancy, but also the lifestyle of pregnant women, in particular their diet and physical activity.

In America and parts of Europe where the Institute of Medicines' recommendations for gestational weight gain are used, it is assumed that weight gain is absolutely modifiable through behaviour change. However in the United Kingdom, the viewpoint is different. Here there is an acceptance that other factors may be contributing to gestational weight gain, and therefore the focus tends to be on having and maintaining a healthy lifestyle rather than focusing on weight gain per se. However, there is little doubt that excessive weight gain due to over consumption and inactivity is an area which can be targeted to ensure best possible outcomes.

There have been a number of studies which have trialled interventions to reduce risk of the development of overweight or obesity during pregnancy, with varying success. None of studies that were found within the review had taken place in the UK. These trials aimed to reduce weight gain through changes in diet and physical activity, yet there was a dearth of studies that utilised existing behaviour change theories throughout the research process (that is, in the development, delivery and evaluation of interventions). Reporting of patient perspectives of interventions is also disappointingly absent in the majority of studies and this has been noted by other reviews (Tanentsapf et al., 2011, Brown et al., 2012). Obtaining participant perspectives is of value as it may give further insight into why some interventions were more successful than others.

The following section will explore theories of behaviour change and how they can be applied to improve dietary and physical activity behaviours during pregnancy.

1. 3. Theories of behaviour change.

The advice that healthy, low risk pregnant women should receive from clinicians is clear and unequivocal: they should eat a healthy diet and exercise regularly. However, the evidence suggests that many women do not comply with the recommendations (Crozier et al., 2009a, Inskip et al., 2009, Fell et al., 2009, Duncombe et al., 2009). Arguably pregnant women should have a strong motivation to improve self-directed health behaviours such as diet and exercise; although it would appear that there is a gap between intention and actual behaviour (Gaston and Cramp, 2011). Lifestyle changes such as diet modification or increasing/commencing an exercise regime are frequently not seen as inherently enjoyable experiences, in other words for many they lack an intrinsic value. Advice alone, it would seem, is unable to prompt individuals into making positive changes to behaviour. This has been observed by many health professionals, from General Practitioners, through to physiotherapists and dieticians alike: advice and providing information regarding health behaviours such as smoking cessation, exercise or diet alteration would appear not be enough to encourage individuals to make the desired changes (Boyce et al., 2008, Mason and Butler, 2010). As a practising midwife I have often been frustrated that the well intentioned advice that I have given to women (be that to consume a healthy diet or to stop smoking etc.), appears to have been ignored, and the behaviour continued despite the evidence of the harm that it may pose to their health and the health of their offspring. The question, therefore, is how can midwives facilitate women to change their behaviour in order to improve health outcomes? The field of health psychology may provide some answers. The following provides an overview of some of the more pertinent psychological theories of behaviour change relating to health and provides a basis to better understand the mechanisms involved in promoting healthy behaviours. Firstly some key terms will be explored.

1. 3. 1 Motivation

Motivation can be defined as the process by which an individual initiates, guides and maintains goal oriented behaviour (Dixon, 2008). Motivation is seen in many of the day to day behaviours of individuals, including those required to maintain life (e.g. eating and sleeping), those behaviours that are expected of us as members of a wider society such as attending school, or work and those behaviours that are selected by individuals such as hobbies and interests. Motivation is recognised as key to behaviour, and plays an important role in the ability of an individual to achieve behaviour change (Michie et

al., 2011). It can be divided into two categories: intrinsic motivation and extrinsic motivation. Intrinsic motivation refers to motivation that is guided by an internal sense of either interest or enjoyment and comes from within the individual (Deci and Ryan, 2002). An example of intrinsic motivated behaviour could be seen with dietary behaviours such as eating fruit. A child may consume an apple, not because she feels she ought to but because she enjoys the taste of a Granny Smith, she is intrinsically motivated to eat the apple. In contrast extrinsic motivation is a motivation that is guided externally; an individual is incentivised to behave in a particular way through external means (Deci and Ryan, 2002). Behaviour could be extrinsically motivated by reward, such as money or through an expectation to conform. As an example of extrinsic motivation, we can return to the young girl and her food; she may eat a whole bowl of stew because she has been told by her mother that she is not allowed to get down from the table until it is finished. She therefore eats all of the stew not because she enjoys it but because she knows that her mother will be cross if she does not finish it. In other words her behaviour is extrinsically motivated as it is valued for reasons other than the inherent enjoyment it brings.

When we look at health behaviour change, the lines between intrinsic motivation and extrinsic motivation can be less straight forward. If we take commencing a programme of exercise as an example: a previously sedentary individual may choose to start to go to the gym to become fit, they are motivated to change through a sense of obligation to improve their health. They are extrinsically motivated to exercise. However, this may alter; for some going to the gym may change from being an extrinsically motivated behaviour (they exercise because they ought to) to a more intrinsically motivated one as after time they may learn to enjoy and feel good about their ability to exercise. Therefore categorising behaviour as being guided either by intrinsic or extrinsic motivation is problematic as the boundaries between the two are not always clear cut (Stockdale et al., 2010) and it fails to take into account the fact that behaviour can be guided at times by a combination of motivating factors. Motivation therefore, should not be viewed as a static concept, as it can be modified and enhanced and theorists believe that motivation can be enhanced through an individual's sense of self efficacy (Michie et al., 2011).

1.3.2 Self-efficacy and regulation

Self-efficacy can be defined as an individual's confidence in their ability to achieve a goal and it has been shown to be predictive of intent and behaviour (Bandura, 1977a). Therefore if an individual believes that they are capable of carrying out a

particular behaviour or in achieving their goal, in turn they are more likely to be successful and able to maintain that behaviour. The concept of self-efficacy is central to many of the psychological theories relating to behaviour change; it is closely aligned with competence (Deci and Ryan, 2002) and is a key component of perceived behavioural control (Ajzen, 1991) (see page 62).

Successful maintenance of behaviour change requires an individual to not only believe that they are capable of change (self-efficacy) but also to make a conscious effort to influence their behaviour to overcome internal urges or impulses that may be seen to hinder the achievement of their goal, put simply their self-regulation (de Ridder and de Wit, 2006). Self-regulation is therefore the control originating from within the individual that drives or motivates them to behave in a particular way despite behavioural obstacles. It should also be noted that behaviour can be affected through external regulation also, and comes from a number of sources such as societal norms and values and expectations in the form of reward or punishment (Deci and Ryan, 2002). To illustrate regulation let us return to the little girl and her supper. She knows she is capable of eating the stew, she has a strong sense of self efficacy, however when left to her own devices she must focus her attention on finishing her bowl and overcome her urge to get down from the table and play with her dolls; she is therefore using self-regulation to control her behaviour but her behaviour is also externally regulated as she will receive either reward or chastisement from her mother depending on whether she does as she is told. The concept of regulation is explored further in CHAPTER 4 (page 168).

Motivation, self efficacy and regulation are known to be core constructs that influence behaviour. The models and theories presented below are the most commonly known and frequently cited and provide further possible explanations of other factors that may contribute to behaviour change.

1. 3. 3 Health Belief Model

The Health Belief Model (HBM), was developed by Rosenstock in the USA in the late 1960's to explore, understand and predict why individuals took up health screening or prevention programmes and is one of the most widely known theories in health related behaviour (Strecher and Rosenstock, 1997). The HBM originally comprised four core constructs relating to an individual's perception; susceptibility, severity, benefit and barriers. Effectively the HBM provides a basis for understanding why or why not an

individual will act to protect or promote their health. The model suggests that if an individual feels that a health condition is likely to affect them (susceptibility) and that it will have negative consequences for them (severity) then their perception of threat to their health is high. If they also believe that acting to address this threat will be advantageous (benefit) and will not outweigh the negative consequences of taking action (barriers) they are more likely to behave in a health protective way. Thus it can be seen that there is a clear interplay between perception of threat (both susceptibility and severity) and perception of cost-benefit to action. This model has been adapted to include an additional three variables, which are thought to better improve its applicability in predicting a range of health behaviours (Thirlaway and Upton, 2009). Firstly 'cues to action', which refers to events that may instigate action and can be either physical or environmental: for example a symptom of a health condition such as a persistent cough would be a physical cue to action to consider smoking cessation, whereas a public health advertisement about lung cancer would be considered to be an environmental cue to action and may prompt smoking cessation. Secondly 'other variables' was added to the HBM and refers to contextual variables that may indirectly influence health behaviours such as socio-psychological and demographic variables (Strecher and Rosenstock, 1997). Therefore social economic status, upbringing, personality, gender and ethnicity may impact upon the way an individual responds to threats to their health. The final variable included with the HBM is that of self-efficacy (Rosenstock et al., 1988); whether an individual believes they are capable of effectively carrying out a behaviour will determine whether they instigate and maintain that behaviour. A smoker who believes they are incapable of quitting is unlikely to be successful in attempts to quit.

Although the HBM has been widely used by researchers since its inception, it is not without its critics. It has been suggested that HBM constructs are based on the assumption that people's health behaviour is driven by their perceptions and therefore they are rational actors capable of change through conscious processing (Taylor et al., 2007). It therefore does not take into account the influence that habit may have on health behaviours nor does it acknowledge emotional factors such as moods, fear or denial (Ogden, 2007). The role that health professionals or social support systems have in facilitating or thwarting health behaviours is also lacking from the model (Davidhizar, 1983). Further, reviews of the evidence have suggested that the use of the model has not enabled a better understanding of the influence of environmental components such as social and economic and the way these impact upon health

behaviours (Taylor et al., 2007), and that arguably these variables are likely to have as great if not greater impact than the core cognitive constructs.

1.3.4 Social Learning Theory

In contrast to HBM, Social Learning Theory (SLT) also known as Social Cognition Theory emphasises the influence of environmental components in behaviour change, through the process of observed learning. The theorists argue that not only does environment affect behaviour, but behaviour also affects environment (Bandura, 1977b). Albert Bandura developed SLT in the 1970's and his theory has been applied to many spheres due to its applicability across various behavioural domains: education, health, marketing, crime etc. (Akers, 2009, Ogden, 2007, Bandura, 2001). SLT stemmed from Bandura's research exploring the development of aggressive behaviours, the most famous of which was the 'Bobo doll experiment'. The experiment was a matched pairs design where children observed either a film of an adult behaving aggressively with a doll or a film with an adult behaving non aggressively with a doll. The children's behaviour was later observed; those children who had seen the film with the aggressive behaviour were found to be more likely to display the aggressive traits when presented with the same doll (Bandura et al., 1961). Bandura argued that this demonstrated that aggressive behaviour could be learned through observation, imitation and modelling. Modelling was key to the theory as an individual must identify with the model in order to imitate the behaviour. Therefore it is possible to change behaviour through effective modelling. According to SLT effective modelling process is based on 4 requirements: Attention, Retention, Reproduction and Motivation (Bandura, 1977b). To learn a new behaviour it is necessary to pay attention, if your attention is distracted this will inevitably affect your learning. Not only is it necessary to be attentive, it is also important to remember what you have observed (retention), as without remembering it imitating the learned behaviour (reproduction) is not possible. And it is only through repeated reproduction that the behaviour can be mastered. Lastly a pre-requisite of effective observational learning is motivation; there are reasons that you are driven to behave in a particular way and this is usually through either reinforcement or punishment. An example of effective modelling could be seen in cooking a meal: as a child you may have frequently watched one of your parents cook a meal for the family, on occasion may have let you assist them. They show you how to prepare and cook the vegetables which requires you to pay attention and recall it (retention) in order to imitate this action (reproduction), your parent is thankful for your

assistance and praises you, this then encourages you to help out the next time (motivation). Later Bandura developed the theory further by adding two new aspects: self-regulation and self-efficacy and renamed it Social Cognitive Theory (Bandura 1986).

As with HBM this theory still does not take into account the effect that emotions may have on behaviour, with again an over emphasis on the role of cognition, where an individual weighs up the pros and cons of a behaviour before deciding to replicate it. Put more simply Social Learning Theory proposes that intent is key to behaviour but does not appear to take into account non-volitional control of behaviours (Thirlaway and Upton, 2009) and in doing so neglects the role that habit plays in determining behaviour.

1.3.5 Theory of Planned Behaviour

Similar to the Health Belief Model and Social Learning Theory, Ajzen's Theory of Planned Behaviour (TPB), as the name suggests, is based on the premise that actual behaviour is the direct result of behaviour intention (Ajzen, 1985). This theory originated from his earlier work on the Theory of Reasoned Action (Ajzen & Fishbein 1980). Ajzen argued that there were three core constructs that can be used in order to predict intention, these are: attitude, subjective norms and perceived behavioural control (Ajzen, 1991, Ajzen, 1985), (see Figure 1 page 63).

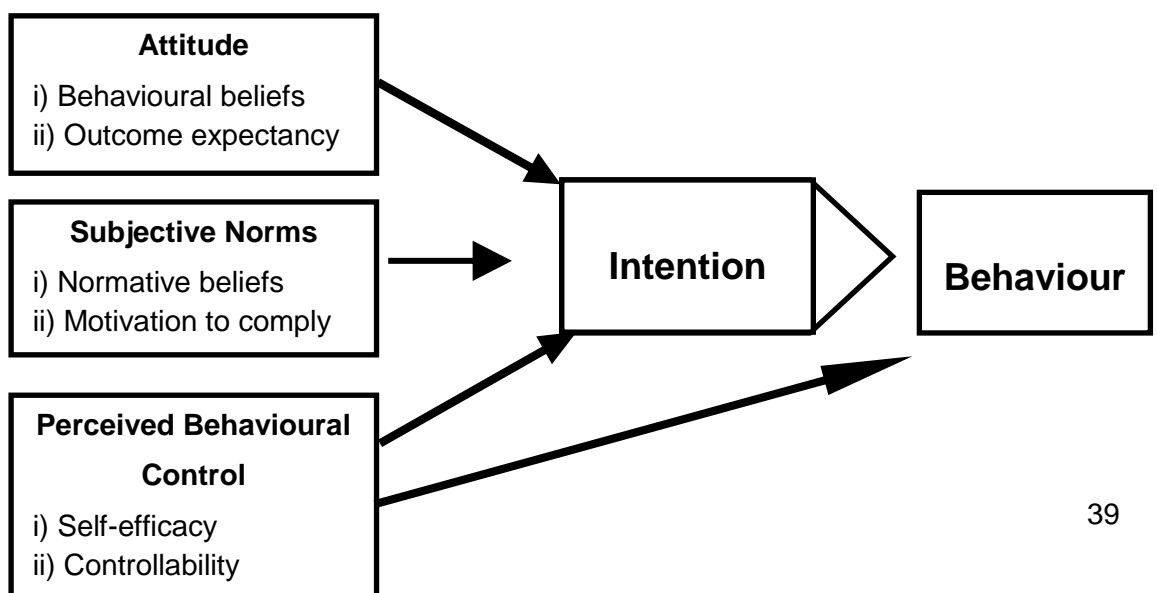
Firstly, attitude is influenced by two components, behavioural belief and outcome expectancy; therefore what you believe the consequences are of carrying out a behaviour and how you view that consequence will determine your attitude and therefore your intent to perform the behaviour. Subjective norms refer to the social pressure that you experience to perform a particular behaviour and subjective norms are influenced by a) normative belief and b) motivation to comply. In other words what is expected of you by significant others (normative belief) and how you feel about that expectation (motivation to comply) will dictate your intention. The final core construct is that of perceived behavioural control and according to the TPB this is predictive of both intent and actual behaviour and is therefore the most predictive construct (Ajzen, 1991). Perceived behavioural control by Ajzen's own admission is heavily influenced by the work of Bandura and comprises two subcomponents; self-efficacy and controllability (Ajzen, 2002). Therefore perceived behavioural control is affected by

whether an individual perceives they are able to perform a behaviour and the extent to which they perceive that they can control that behaviour.

Although it has been recognised that intention can be predictive of actual behaviour, this is not always the case as for some areas, intention has been shown to be a poor predictor (Kor and Mullan, 2011). It has been suggested that one of the reasons for the difference between intention and behaviour may be due to contextual factors where individuals fail to adequately predict the circumstances requiring them to perform the desired behaviour predictor and thus some have argued that it is a limitation of the theory (Sutton, 1998). For example an individual who has decided to reduce their weight through eating a low-fat diet will have changed their shopping and eating habits in order to achieve this goal but when invited to a dinner party with friends she may not have made adequate provision for such an eventuality. It is recognised that implementation intentions or 'if-then' plans incorporated into goal setting may provide the situational context that enables an individual to perform the behaviour (Webb and Sheeran, 2007).

As with both the HBM and SLT it has been argued that a further limitation of this theory is that it does not take into account other variables which may affect intention such as emotions (e.g fear, or threat) and past experience and habit (Perugini and Bagozzi, 2001). However, as Ajzen argues that past experience and habit are actually key elements to an individual's perception of behavioural control (Ajzen, 1991) it would suggest that perhaps they are not overlooked by the theory.

Figure 1 Theory of Planned Behaviour - Core constructs



1. 3. 6 Transtheoretical Model

Finally the Transtheoretical Model (TTM) developed by Prochaska and DiClemente (1982) differs from the other models in that it is based on the idea that behaviour change is not a single acute event rather it is a set of discrete stages (Prochaska and DiClemente, 1982). TTM has been widely applied to the field of addictions most notably smoking as Prochaska and DiClemente's theory stemmed from smoking cessation research (Prochaska, 2008). The model proposes that behaviour change involves progressing sequentially through six Stages Of Change (SOC): Precontemplation (not thinking about changing behaviour), Contemplation (considering change), Preparation (making plans to change behaviour in the immediate future), Action (changing the behaviour), Maintenance (working to prevent relapse of old behaviour) and finally Termination (the new behaviour is now so ingrained within the individual that they no longer require conscious effort to maintain it) (Prochaska and Velicer, 1997). Aside from the SOC, the model also incorporates a number of other constructs such as self-efficacy, processes and decisional balance.

The theory recognises that often behaviour change takes more than one attempt before it is successful. Inevitably people will have a relapse of their old behaviour and this is included within the stages of change where instead of an individual moving forward through the SOC they can fall backwards and may even go back to the beginning; the precontemplation stage. This is referred to as 'recycling'. However, it is suggested that when an individual is thwarted in their attempt to change their behaviour this should not necessarily be viewed as a negative thing rather it should be seen as a learning experience which then equips them to tackle behaviour change again (DiClemente et al., 2004) . Through using the stages of change, it is possible to assess an individual's 'readiness to change' and interventions and appropriate support can then be targeted accordingly.

As with all the models the TTM has been subject to criticism. A review of 87 studies which used the SOC in targeting various problem behaviours found that contrary to the foundation of the model, there was no evidence of discrete stages nor was there evidence of sequential movement through the stages (Little and Girvin, 2002). Robert West (2005) is scathing in his assessment of the Transtheoretical model and suggests that the model is little more than a statement of the obvious; he argues that it is not surprising that an individual who is thinking about changing their behaviour is more likely to change than someone who has no intention of change (West, 2005).

However, the TTM stands out amongst the other models in that it recognises that behaviour change should be seen as an on-going process and not simply as a dichotomy, and as such has influenced the way in which behaviour change is viewed (Thirlaway and Upton, 2009).

1. 3. 7 Theories of behaviour change - discussion

There are many theories of behaviour change which have been applied to health related behaviour and although they have not been received with unanimous support they do assist in providing an insight into what can facilitate and what can thwart an individual to change their behaviour. These theories have influenced maternity research including those exploring areas such as breastfeeding (Stockdale et al., 2008, McMillan et al., 2009), smoking cessation (Natan et al., 2010), exercise intention (Symons-Downs and Hausenblas, 2003), accessing antenatal care (Stout, 1997), and interventions addressing gestational weight gain (Gray-Donald et al., 2000, Phelan, 2009b).

Central to all the theories are the concepts of motivation, and self-efficacy and it is evident that without a degree of both, behaviour change is unlikely to occur. Pregnancy is a time when arguably many women will have an increased motivation to consider making changes to their lifestyle behaviours to protect their growing baby from harm and to ensure they have the best possible start in life. Midwives as the health professional responsible for providing the majority of the antenatal care could be considered to be perfectly placed to utilise this motivation and support women to make positive changes to their health behaviours.

1. 4. Summary of Literature Review

Obesity is recognised as one of biggest health challenges to face the UK due to its strong link to many morbidities and steep rise in prevalence (DOH, 2009c). In the United Kingdom, pregnant women are advised by their maternity care providers on the actions they can take to ensure the best possible outcome for themselves and their baby. From the very first meeting with their midwife, it is recommended that women are advised against alcohol and tobacco consumption, and instead a healthy lifestyle is promoted which should include healthy eating and foods to avoid as well as safe levels of exercise/activity during pregnancy (DOH, 2009d). Women are not routinely given information regarding weight gain in pregnancy due to there being a lack of consensus on what is considered to be appropriate gestational weight gain; instead the focus tends to be on eating a healthy well balanced diet (NICE, 2010d).

Although this does not provide a guarantee of a healthy baby it is hoped that women will make healthy lifestyle choices during their pregnancy that will reduce the risk of complications which may be caused as a result of modifiable behaviours. Not only is pregnancy seen as a time when women may be particularly motivated to change their health behaviours for the benefit of the developing fetus, this time has also been viewed as a perfect opportunity for women to make more permanent changes to their lifestyle which could then set patterns of behaviour for the next generation (Phelan, 2009b).

There is some evidence to suggest that pregnant women will make changes to those behaviours that they see as being of risk to their growing baby, such as smoking, caffeine intake and avoidance of food that may carry diseases such as salmonella and listeria (e.g. undercooked eggs or meat, some cheeses, moderate amounts of tuna etc.) (Crozier et al., 2009b). However not all health behaviours are appropriately modified during pregnancy, and researchers have found that making more health promotive changes to lifestyle such as increasing fruit and vegetable intake (Crozier et al., 2009a) and taking part in regular exercise or activity appear to be areas that are less likely to be subject to change (Clarke and Gross, 2004). Avoiding the small number of foodstuffs that have been associated with risk of disease may be relatively straightforward to achieve, however to make the more extensive health promotive changes to behaviour requires women to believe that not only *should* they improve their diet and physical activity but that they are *capable* of changing and maintaining those healthy behaviours.

From the literature it is evident that in the absence of clinical guidelines, there is limited information on current clinical practice regarding the management of gestational weight gain. Little is understood about how pregnant women in the UK feel about their weight gain management during pregnancy and what would be the most appropriate methods to support them to maintain a healthy diet and appropriate physical activity levels in line with current recommendations for pregnancy. This research project seeks to address this gap in knowledge through a series of studies.

1. 5. Introduction to the research

The research that I conducted had three distinct aims, and consisted of three separate but related studies. The first study set out to explore the clinical context across Wales, to find out what women were being advised regarding weight gain and how they were being supported in this area by their maternity care providers. The second study aimed to explore women's views and experience of weight gain during pregnancy looking at their dietary and activity intentions and whether they were able to achieve them. It was originally planned that these two initial studies would then inform the third and final study, the development of an intervention to assist pregnant women to manage their weight and reduce the risk of excessive gestational weight gain. However, it became apparent that without UK clinical guidance and a general consensus regarding what was deemed to be appropriate weight gain during pregnancy, this was not feasible; for how would it be possible to establish what could be deemed as excessive without agreement on what is considered to be appropriate weight gain?

The current UK clinical advice that is given to pregnant women is to eat a healthy well balanced diet that is not too high in fat or sugar and to pursue an active lifestyle (DOH, 2009d). This should ensure that if adhered to, the weight gained through the antenatal period should be seen as appropriate and necessary, unless due to some pathology (e.g. oedema due to pre-eclampsia). In other words, the weight gained as a result of pregnancy would not be due to an unhealthy diet or lack of exercise, but the result of other external factors. The focus of the advice is consequently centred on healthy lifestyle behaviours rather than specifically targeting weight gain. Therefore the final study comprised an intervention focused on dietary and physical activity behaviour modification as opposed to actual measures of weight gain, as it was felt this would be the most appropriate course of action, in line with current recommendations. The intervention was based on a framework for motivation and behaviour change informed

by the health psychology literature and which is explored in greater detail in CHAPTER 4 (see page 168).

1.5.1 Aims

This research has three related aims, firstly to obtain an overview of the current antenatal service provision in Wales relating to gestational weight gain in particular the midwifery advice being given. It also aims to explore women's experience of weight gain during pregnancy through their diet and physical activity intentions and reported behaviour. And it also seeks to develop and evaluate an appropriate intervention to promote and improve pregnant women's dietary and physical activity behaviours informed by the two preliminary studies.

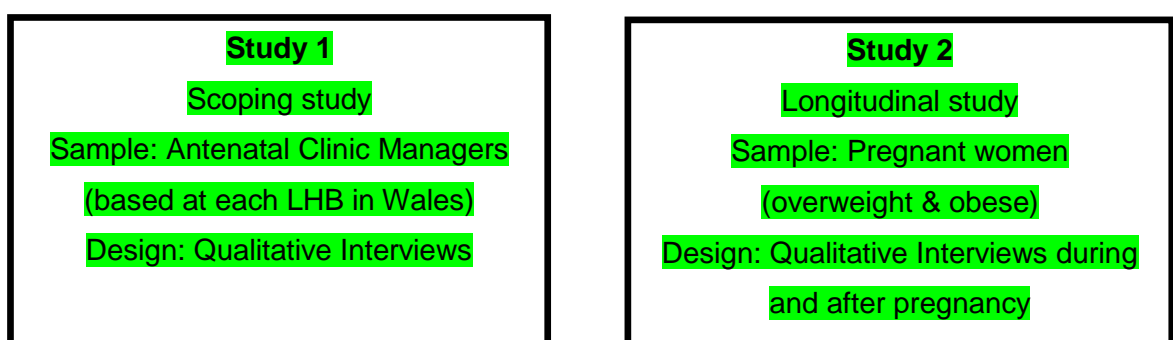
1.5.2 Objectives

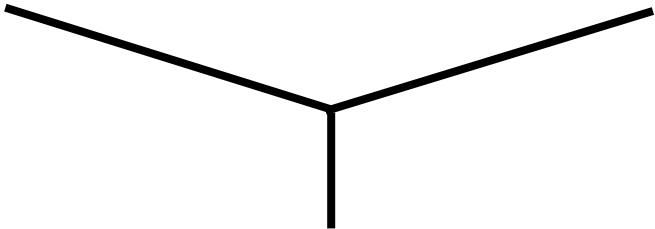
1. To carry out a scoping study with regards to the current clinical antenatal management of overweight and weight gain in Wales.
2. To collect longitudinal qualitative data on overweight women's experiences of pregnancy weight gain, using semi-structured interviews.
3. To conduct a prospective pilot study of an intervention and explore its feasibility and acceptability.

Therefore the research involves three distinct but related studies in two phases. Firstly phase one comprised the scoping study and longitudinal study which ran concurrently between January 2010 and June 2011. Phase two was informed by the two preliminary studies and involved the development of the intervention and its piloting to assess feasibility and acceptability. The following chapters will address each of the studies in turn, starting with the scoping study.

Figure 2 Research Flow chart

PHASE ONE – Preliminary studies





PHASE TWO: Intervention development



Study 3
Pilot Intervention Study
Sample: Pregnant women
(healthy & overweight)
Design: Mixed methods –
Questionnaires & Interviews

CHAPTER 2.

STUDY ONE: THE SCOPING STUDY

Introduction

There is clinical recommendation that all pregnant women booking for maternity care should have their Body Mass Index calculated in order to identify appropriate care plans (NICE 2010). The NICE 2008 antenatal guidance in use at the time of the interviews stated that women identified as having a BMI >35 will require additional support in the form of referral to an obstetrician. And as already discussed the UK lacks clinical guidance regarding gestational weight gain and instead it is recommended that all women should be given information on eating a healthy balanced diet and being physically active (NICE 2008). In the absence of guidance regarding weight gain in pregnancy it was unclear what advice and services were being offered to those women booking for maternity care that would assist them to manage their weight. Also the NICE antenatal guidelines are just that: guidelines and they are not protocol. Thus practice may vary across the country and the extent of the variation was unknown. This study therefore aimed to obtain an overview of the current antenatal management of weight and weight gain in pregnancy across Wales. This chapter will detail Study One, but first it is necessary to briefly provide some background information and to summarise the context of the NHS in Wales.

The latest available statistics show the number of live births recorded for Wales in 2010 was 35,952 with the majority of these births taking place in the south of the country, where the three largest Obstetric Units are based (ONS, 2011).

Relatively recently the National Health Service (NHS) in Wales underwent extensive and comprehensive changes to its structure with the purpose of redesigning the delivery of services. On the 1st October 2009 the system changed from an organisation with 22 Local Health Boards (LHB's) responsible for seven NHS Trusts, to a more simplified integrated approach with seven new Local Health Boards. Only three specialised Trusts remain; Public Health Wales, Velindre and Welsh Ambulance Services. The new system integrated the commissioners of services with service providers and it was hoped that this would result in a less bureaucratic organisation leading to improvements in patient care (Welsh Government., 2009).

These changes meant that the research carried out was done so during a period of acclimatisation with many of the maternity units undergoing management restructuring. Ethical approval for the scoping study was obtained prior to restructuring, though recruitment and data collection began in January 2010, three months after the services were reconfigured.

2. 1. Methods

This scoping study was designed to obtain an overview of the current antenatal management of weight and weight gain across Wales and to discover any consistencies or inconsistencies in the antenatal provision. As a scoping study this piece of research is designed to set the context and as such does not apply theory.

2. 1. 1 Sample and recruitment

A qualitative approach using one to one interviews was used to obtain information regarding the antenatal management of weight and weight gain in Wales. Purposive sampling is when the selection of the sample is based on the researchers judgement and when the inclusion criteria is linked to the research question (Sanders, 2010). In this case the participants selected were the ones judged to be the most informative. This study did not set out to identify what advice and support individual women were receiving from midwives relating to either weight or lifestyle behaviours. Instead it sought to explore the broader policy context in which this care was provided, as midwives should be guided by the policies and protocols of their employer, if this exists. Therefore interviews were conducted with the antenatal clinic managers responsible for unit policy in this area, rather than from the community midwives providing care or from women receiving care. The population for this study was identified as those Antenatal Clinic Managers based in large obstetric units from each applicable Local Health Board (annual number of births per unit ranged from 1,300 – 6,000). Six of the seven Local Health Boards were included in the study, as one was excluded due to there being no Obstetric led units within it.

The total population was 13 Antenatal Clinic Managers and therefore due to the small numbers involved, it was possible to invite the whole population into the scoping study. Antenatal Clinic Midwifery Managers were identified by their respective Head of Midwifery and were approached via letter and asked to participate (see Appendix 3).

Information about the study, and the researcher was supplied in the form of the participant information sheet (see Appendix 4) which was included with the letter and contact details were provided in order to answer any queries that arose. Two weeks following the mailing of letters, each Antenatal Clinic Manager was contacted by telephone and asked if they wished to take part in the study.

All Antenatal Clinic Managers were registered midwives practising within their Local Health Board. The role of the antenatal clinic manager was not just an administrative or managerial one as they were in daily contact with women who had booked for maternity care, providing some elements of their care. All managers who were approached consented to participate and a mutually convenient date and time were arranged for the interview. It was decided that for those managers based in the North of the country, telephone interviews as opposed to face to face interviews were deemed the most appropriate, as the geographical distances involved would mean extensive travelling and overnight accommodation, which would deplete the limited research budget.

2.1.2 Data collection

One to one semi-structured interviews were used for the purpose of exploring the current clinical management of overweight women across Wales and the advice being given regarding weight gain. It is widely acknowledged that one of the advantages of using one to one interviews to collect data is that ambiguity on the part of the interviewer or interviewee can be clarified, which should result in less misinterpretation (Bowling, 2009) and is particularly relevant when investigating sensitive issues, such as weight. As little is understood about antenatal weight gain management in pregnancy due to a lack of clinical guidance, it was felt that more accurate and meaningful responses could be obtained via this method. Admittedly, a survey method such as questionnaires could have been used to obtain some of the information, but given the heavy workload of these busy professionals, it was felt that a more personalised approach would lead to a higher response rate and more in-depth answers. Due to the nature of the role as Antenatal Clinic Manager, there is a high administrative burden on these midwives, and requesting them to complete a questionnaire was felt to only add to this burden.

A total of three of the interviews were conducted over the telephone, the remaining eight were undertaken face to face in the respective antenatal clinics. There has been some debate regarding the quality of data gathered via telephone as opposed to during

face-to-face interviews as telephone interviews are usually used for more structured survey interviews (King and Horrocks, 2010) although this is not a universally held belief; indeed many researchers have endorsed telecommunications as a method for collecting data (Sturges and Hanrahan, 2004). The budget constraints meant that the decision to use the telephone for those managers located in the north of the country was a pragmatic one, however, it was deemed important to get a picture of the provision across the whole of Wales which would not have been viable with face to face interviews. The antenatal clinics were chosen as the venue for the face to face interviews as it was felt this would cause the least disruption for the managers and minimise time commitment. A schedule was used to provide focus to the interview (Appendix 5), though diverging from this allowed for the pursuit of greater detail and clarification of issues. Interviews lasted approximately half an hour and all (including those conducted over the telephone) were digitally recorded using a small handheld recorder. Participants knew that interviews were recorded and gave their permission during the consenting procedure prior to commencement. Recording interviews ensured that transcribing was accurate, and in the participant's own words and therefore a true reflection of the interview. It also enabled the conversation to have a more relaxed, natural flow that was not interrupted by frantic documenting of responses.

As can be seen from the schedule, general data regarding the unit was collected at the start of the interview. Questions were asked about what information/advice was provided to women concerning, diet, exercise and weight gain during pregnancy and what care pathways and referral mechanisms, if any, were used for women identified as being overweight or obese. Managers were also asked whether they had experienced women requesting assistance/ further information with their diet or weight gain.

Two final questions related to the Antenatal Clinic Managers' views, firstly on whether they had noted an increase in the prevalence of overweight/obese women attending the antenatal clinic. And secondly whether there was specific care or support that they would like to see being implemented within their unit to support women with a raised BMI. This final question was of particular interest as it could provide insightful and credible professional opinion as to how best to assist and support women regarding their diet and activity levels during the antenatal period.

The overall purpose of these interviews was to obtain an understanding of the commonalities and variance of the antenatal clinical advice being given to women regarding diet, physical activity and weight management as well as the antenatal

management of women with a high BMI category and the specific advice they are being given regarding their gestational weight gain.

2. 1. 3 Ethical considerations

As with all research involving human participants, this study was required to take into account ethical issues to safeguard the rights of the participants. The provision of comprehensive participant information sheets allowed the managers to make fully informed decisions about whether or not they would wish to take part. Because prior approval to approach the managers had been gained from their respective Heads of Midwifery, it was made clear to all potential participants that the decision to be included in the study was entirely their own choice. This was important because they might have felt that the sanctioning of the study from their line manager would pressurise them into consenting.

All participants were informed that they could withdraw at any time without consequence. Consent was gained and documented through a written consent form (Appendix 6). For those who undertook the telephone interview, the form was read out and explained and an oral consent was obtained and recorded prior to commencing the interview. All participants were aware of my profession as a midwife and one of the participants was known to me, due to being colleagues within the same hospital. I was cognisant of the fact that this could cause a conflict between my role as a health professional and that of interviewer. Therefore I made it explicitly clear prior to commencing the interview the distinction between these two roles, and that I was working in the capacity of researcher and not midwife. This was easiest for those Managers who I did not know prior to the interview. For the interview within my own LHB, it was slightly more challenging, particularly given the different role status, as I was known to be a Band 6 midwife, and the midwife as a Band 7 was a manager, which made me a little nervous. This conflict of status is recognised and has been documented by other researchers (King and Horrocks, 2010). Interestingly, within minutes of meeting the manager, it became apparent that she too was anxious about the interview, and once both of us had voiced this, we were able to move on and build a rapport and we noticeably relaxed into our roles as interviewer and interviewee.

In the unlikely event that participants became distressed at any point during the interview, referral to appropriate source of counselling had been built into the protocol as the potentially sensitive nature of the topic was recognised by the researcher. No such referrals were required to be made.

The secure handling and storage of data assured that confidentiality was maintained, and each participant was allocated a pseudonym to provide anonymity. It is recognised that with such a small population, it may be possible to identify which LHB the participant belongs to, however the names of the LHB's will not be used in the writing up of the study, and all participants were informed of this. Permission for the use of anonymised verbatim quotes was gained as part of the consent process, and clearly documented within the consent form.

2.1.4 Ethical approval

Advice was sought regarding the nature of approval required for study 1 from the Chair of the South West Wales Local Research Ethics Committee (LREC). It was agreed that this scoping exercise was considered to be service evaluation and as such did not require a submission to the LREC, although Research and Development (R&D) approval was still required. This study was therefore reviewed by the ethics committee based within the School of Health Science¹ at Swansea University and following clarification of some issues raised it was given approval.

2.1.5 Gaining access

As R&D approval was needed from each of the relevant Local Health Boards, a total of six departments were contacted. R&D approval across Wales was not a standardised procedure and so each area required differing levels of information before approval was provided. Three R&D departments did not require service evaluations to be recorded or reviewed whilst one required an honorary contract to be drawn-up prior to commencing recruitment. All R&D Departments approved the study subject to gatekeeper approval.

Following confirmation of ethical and R&D approval, Heads of Midwifery (one per LHB) were written to and asked for their permission, as gate keepers for the involvement of Antenatal Clinic Managers in the study (Appendix 7). They were given a copy of the research proposal and encouraged to make contact should they have any queries relating to the study. Obtaining a response from each Head was a longer process than expected as it was during this time that the NHS in Wales was undergoing structural changes (see page 76 for further details) which impacted on the midwifery management structure in some LHB's. However, eventually all Heads of Midwifery responded, and all but one gave their permission to approach the Antenatal Clinic

¹ Now called College of Human and Health Sciences

Managers. The Head of Midwifery who declined permission to carry out the research wrote to explain that she did not feel it was appropriate to approach the two Antenatal Clinic Managers at that point due to the degree of departmental changes occurring within the LHB. Subsequently, a total of eleven Antenatal Clinic Managers from across five LHB's were contacted by letter and invited to participate in the study.

All Antenatal Clinic Managers who were approached agreed to take part in the research, such a high response rate (100%) can be seen as providing evidence that Managers thought this issue was of importance.

2.1.6 Method of analysis

Following the interviews the digital recordings were transferred to a password protected hard drive of a computer, ready for me to transcribe them at a later time point.

Transcription was carried out verbatim as soon as was reasonably possible following the interview, using Word. Transcribing, although a laborious task, assisted me to have an in-depth familiarity with the data. Transcripts were then exported to NVivo 8, a qualitative software package used for the organisation and analysis of data. Computer aided qualitative analysis software such as NVivo has been criticised by some for losing a 'closeness to the data' and utilising quantitative methods which reduces the richness of data and provides a temptation to count (Weitzman, 1999). However I would argue that it serves to assist, not in the analysis of data, but rather in the organising and handling of data. Unlike the quantitative programmes, NVivo is not able to analyse the data; it is therefore down to the individual researcher to analyse and interpret the data.

Interviews were anonymised by removing all personal identifying details (such as names, areas etc) at the transcription stage. Each transcript was read through several times and this allowed me to become familiar with their content. This kind of deep familiarisation with transcripts is recognised to be of great importance in aiding the analysis and coding of data (Gibbs, 2007). Following familiarisation of transcripts, they were subsequently analysed. Factual coding was used for the first few questions relating to the demographical data of the unit (e.g. number of births per year), whilst thematic content analysis was used for the majority of the text.

The basic framework for analysis was a three stage approach as documented by King and Horrocks (2010). Firstly descriptive codes were classified, this stage aimed to identify and describe the view points and perceptions of participants in order to code them, these initial descriptive codes were labelled. Next was stage two; interpretive

coding. The descriptive codes were looked at to see if they had any commonality and similar meaning that meant they could be grouped together under a new interpretive code. Finally stage three involved the defining of the overarching themes using the interpretive coding to identify the key concepts within the analysis. At all times the transcripts were referred back to, which ensured that the codes were developed within the context of the original conversation. As a means to check the reliability of the interpretive coding, four transcripts were given to the supervision team to analyse independently. A meeting was then arranged to cross check the themes and for the discussion and critical appraisal of the coding. This was a productive meeting with mutual agreement regarding the defined codes. As this study was designed to identify the context within Wales the analysis did not seek to apply a particular theoretical framework, rather descriptive analysis was used to achieve the study's aims.

2. 2. Results

This section has been divided into two; firstly the factual coding results will be reported followed by the results of the thematic analysis exploring the Antenatal Clinic Managers' experience and views.

2. 2. 1 Factual coding:

The annual birth rate per unit varied greatly, with the smallest unit having 600 births per year to the largest having in excess of 6000. The majority however (n=7), were medium sized units which had between 1500 – 3000 births per annum.

2. 2. 1. 1 Weight measurements

As per the NICE guidance (NICE, 2008), all units had a policy to record women's weight and height at booking or as soon as was reasonably possible in order to calculate Body Mass Index. The majority of the booking for maternity care took place within the woman's own home and so weight and height measurements were usually taken during the first visit to the antenatal clinic, prior to the dating ultra sound scan (approximately 10-12 weeks gestation). For some women, who were deemed to be low risk and therefore had midwife-led care, their weight and height were recorded by their midwife during a clinic appointment within the community or when the woman attended to have her antenatal blood tests. Two of the managers reported historical use of self-

report measures of weight and height, although this had now ceased and all the managers specified that it was Health Board protocol for measurements to be carried out by a midwife or health care support worker. One manager admitted that although it was policy to obtain an accurate weight and height measurement, on occasion self-report was still being used when access to scales was impractical.

“It should be done by a clinician, however sometimes it will be a self-reported weight.” (Manager Unit 4)

2. 2. 1. 2 Re-weighing of women

When asked about re-weighing of women through the course of their pregnancy, the managers' responses had less uniformity. Some managers stated that it was Health Board policy not to re-weigh although this was superseded if there was cause for concern regarding an individual's weight. A few reported re-weighing those women who requested the Triple Test² at approximately 16 weeks gestation. A number of managers stated that other health professionals requested reweighing, and the anaesthetists were the most commonly mentioned. The majority of managers stated that all women booking for an elective caesarean section would be weighed as part of the anaesthetic review and pre-operative assessment process. A few (n=3) reported that anaesthetists requested that all women were weighed at term so if anaesthesia was required for birth there would be an accurate weight recorded. Some managers reported that Consultant Obstetricians occasionally requested the routine re-weighing of women under their care at each antenatal appointment, although this appeared to be at the individual consultant's discretion rather than it being included in a protocol. This tended to be women who had been diagnosed with diabetes, women with a very raised BMI (>35) or those with pre-existing medical disorders. One manager stated that women with a BMI >50 were re-weighed at term as a matter of health and safety protocol, in order to establish whether they required specific specialist bariatric equipment, as much of the usual equipment available within the maternity unit had limits to the safe operating weights (e.g. theatre tables, beds, wheelchairs etc.). It may be that this is included as part of the bariatric protocol in more than one unit, though during the interviews it was mentioned by only one manager.

² Triple Test: Routine screening test for chromosomal abnormalities that calculates the chance of having a baby with abnormality by assessing the result of a blood test and maternal demographic details

2. 2. 1. 3 Referral due to raised BMI

Due to the increased risk of complications that having a raised BMI in pregnancy presents there are national guidelines in place which advise that women classed as obese should have referrals for obstetric, anaesthetic and dietetic review (CMACE/RCOG, 2010).

All units had protocols and local policies for those women identified as having a raised body mass index, whereby they would be referred for obstetric review although the cut off BMI varied from unit to unit. This variation in referral based on BMI criteria persisted with other specialist services, such as anaesthetics and dietetics (see Table 7). Most units had mechanisms in place for referral for anaesthetic review, although for the majority of units the cut off tended to be higher for review by the anaesthetist than for the obstetrician. Dietetic services were limited within maternity units with only four including it within their raised BMI protocol, although the referral to dietetic service was more consistent for those women who were identified as being diabetic. Three units reported that although there was no official protocol for dietetic referral based on BMI alone, if felt to be of benefit, clinicians could use their discretion to refer on an ad hoc basis.

Table 7 Body Mass Index (BMI) criteria for referral

| UNIT ID | BMI REFERRAL CRITERIA | | |
|--------------------------------|-----------------------|--------------|----------------------|
| | Obstetrician | Anaesthetist | Dietician |
| CMACE & RCOG Guidelines (2010) | ≥30 | ≥40 | ≥30 |
| Unit 1 | ≥35 | ≥40 | ≥35 |
| Unit 2 | ≥35 | ≥40 | None |
| Unit 3 | ≥35 | ≥45 | ≥35 |
| Unit 4 | ≥35 | ≥35 | In development |
| Unit 5 | ≥40 | ≥40 | Clinician discretion |
| Unit 6 | ≥35* | ≥40 | ≥50 |
| Unit 7 | ≥35 | ≥ None | None |
| Unit 8 | ≥36 | ≥45 | None |
| Unit 9 | ≥35 | ≥35* | Clinician discretion |
| Unit 10 | ≥35 | ≥35 | Clinician discretion |
| Unit 11 | ≥35 | ≥40 | ≥40 |

* Future plans to change to BMI ≥40

Two managers stated that if women were identified as obese when booking for maternity care they were referred for specialist midwifery management of their gestational weight gain to reduce their risk of obstetric complications.

One of these units (Unit 2) referred women to a consultant midwife with a particular interest in obesity in childbearing. The referral criteria for this were obese women who were otherwise healthy with no underlying conditions or complicated obstetric history. The consultant midwife monitored closely the women's pregnancy and advised them regarding actions they could take to reduce their risk of complications and limit their weight gain, though the manager did not give further details regarding the nature of the advice. At the time of interview this service for obese women was in the process of being audited.

Another unit offered obese pregnant woman participation in a relatively new initiative called Healthy Eating and Lifestyle in Pregnancy (HELP). This was a free, weekly run weight management and physical activity support group and was a partnership between the maternity department and the commercial organisation Slimming World. The group was set up by a consultant midwife and incorporated the joint expertise of a commercial slimming consultant and the maternity expertise of the midwives. At the point of interview with the antenatal clinic manager of this unit, the programme had received substantial funding for a multicentre randomised control trial into the efficacy in the long-term weight management of participating women. This initiative was widely known and was mentioned by four of the Antenatal Clinic Managers, many of which had applied to be one of the centres involved in the trial.

2. 2. 1. 4 Advice regarding lifestyle behaviours

The advice given to pregnant women relating to weight gain, diet and physical activity tended to be limited to the information provided within the Pregnancy Book (DOH, 2009d) with all managers reporting its distribution. This document was given to all women either at the initial consultation with the midwife or when the woman first attended the antenatal clinic for routine care.

Managers reported that discussions about diet and physical activity tended to be on an ad hoc basis and usually fell to the individual community midwife to raise the topic if she felt it to be pertinent. Interestingly one manager specifically noted that providing literature did not necessarily facilitate discussion.

*“... And I would like to think that every woman does get that pregnancy book, but what I don't know, is whether midwives, that actually book the women would draw their attention to that chapter [Your health in pregnancy]. I don't know, but it's there.”
(Manager Unit 2)*

However, another manager noted that midwives regularly documented within the woman's antenatal notes that they had discussed lifestyle behaviours with women although as this was a managerial account it was not possible to ascertain the nature and quality of these discussions.

“Yes they will be given information about exercise in pregnancy at their booking visit. It's in the pregnancy book again. And it explains about exercise in pregnancy. But they do go through it at the booking. I often see it noted, exercise, diet whatever discussed at booking.” (Manager Unit 3)

Some managers mentioned that there was other literature being given out as a matter of routine such as the Food Standards Agency leaflet 'Eating whilst you are pregnant' (Food Standards Agency, 2009) as well as some in-house leaflets (e.g. physiotherapy leaflets, pelvic floor exercise information etc.). However, it was noted by a few that the Pregnancy Book was designed to cover all necessary up to date information in a concise and consistent format, thus negating the need for additional leaflets.

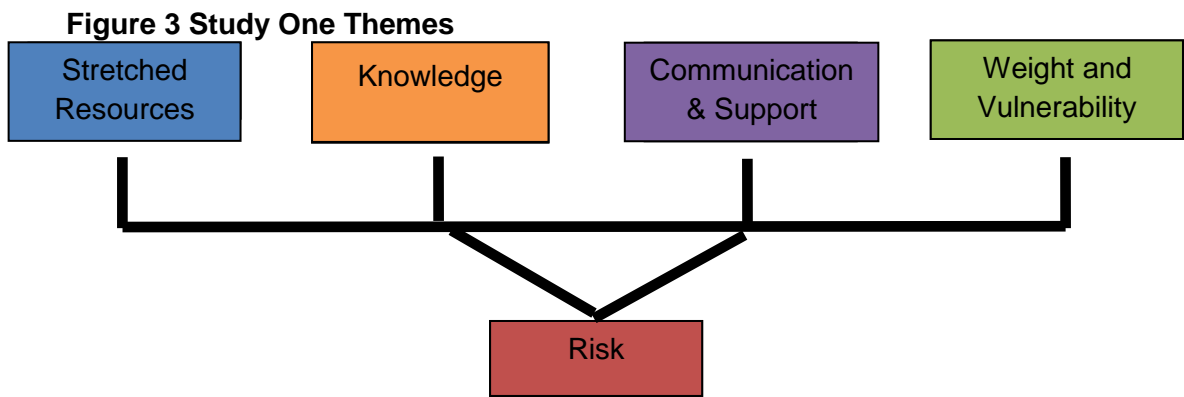
Antenatal exercise provision for all women was limited, with some units offering the opportunity to participate in aquanatal³ classes, although the class sizes were small and due to a lack of resources this service was not available across all health boards.

2.2.2 Thematic analysis

As already discussed, following the factual coding of the data which provided a general overview of the service provision, the transcripts of interviews were further analysed to identify common and recurring themes. This thematic analysis led to the development of four overarching themes, which were: Stretched Resources, Knowledge, Communication and Support, and Weight and Vulnerability (see Figure 3).

It was also noted that there was a commonly occurring theme which ran through all the overarching themes and that was the theme of risk.

³ Aquanatal: Water-based group exercises classes specifically designed for pregnant women.



2. 2. 2. 1 Stretched resources

‘It’s money at the end of the day’

Many managers felt that resources were a hindrance in the provision of and access to adequate services. These can be divided into two key areas: the resources available to the NHS (affecting provision) and the resources available to individual women (affecting access). When referring to a lack of resources within the NHS, the majority tended to refer to health professional time and availability.

“But even if we had somebody who we could, like the dieticians who are absolutely run off their feet. We’ve got a combined clinic here for diabetics and things like that. And the dietician will come to the diabetic clinic but she. She’s stuck with those women who are diabetic. She can’t go out and speak to people who don’t have a problem. Or maybe their problem is obesity. But she hasn’t got time to speak to them.” (Manager Unit 5)

“Yeah. I have been in touch with our dietetic service here about the possibility of referring ladies. But they won’t accept antenatal referrals because they say they are under resourced”. (Manager Unit 2)

The lack of NHS resources also impacted upon the policies for high risk women within the units, where decisions regarding care had to be made based on resources rather than national guidance. One manager specifically made reference to this:

“NICE guidelines say that, in fact CEMACH say that ladies with a BMI of 30 and above should be under consultant led care. But we haven’t adopted that at the moment because, you know. Because of resources.” (Manager Unit 2)

Many managers indicated that the growing volume of women requiring specialist services due to their high BMI was placing an increasing burden on resources, and was especially evident with the anaesthetic and dietetic departments, although the obstetricians were also affected.

“At the moment anybody with a BMI of 35 and above, is recommended that they are shared care. Yeah? Obviously some women can say ‘no thank you I don’t want it’. But they are recommended to be shared care. At the moment there is debate whether that should be dropped to 30 but that would be an awful lot of women in my opinion.” (Manager Unit 7)

“And I suppose because when the anaesthetists decided to see women with larger BMI’s. The volume of people they were seeing, you begin to think. Well gosh there’s a lot of women they’re seeing with BMI’s over 40.... You know, where as we had, somebody coming down to see perhaps 3 people a week, now he comes down twice a week and sees about 10 people.” (Manager Unit 6)

“Although our policy of referring people [to a dietician] with a BMI of 35 and over. I think that maybe there’s a bit of caution in that basically because of the numbers.” (Manager Unit 1)

Two participants had conducted audits to look at the number of women with raised BMI within their areas in order to obtain an insight into the scale of the issue. One manager identified that within her unit the majority of women were classified as being obese (BMI >30), more than double the rate in the general population.

“So we now offer it [Glucose Tolerance Test⁴] to anyone with a BMI of above 30 as the NICE guidelines say. But when we audit that, it’s over half. It’s well over half of the women that book that have a BMI of 30 or above.” (Manager Unit 7)

Another manager identified that a specific antenatal population within the locality had exceptionally high rates of obesity class 3 (BMI >40). To put this in context, prevalence of obesity class 3 within the whole maternity population for the UK is understood to be 2% (CMACE, 2010).

“Especially as we’ve got a satellite clinic up in the [name of area] and there we have identified, we’ve done a bit of an audit and we’ve identified that 55% of women had BMI’s over 40.” (Manager Unit 6)

Three managers noted that because of the increase in women requiring referral, the criteria had to be adjusted accordingly due to the volume of women involved. This

⁴ Glucose Tolerance Test (GTT): A blood test used to diagnose glucose intolerance and diabetes. During pregnancy it is used to identify women with Gestational Diabetes Mellitus (GDM). A known risk factor for GDM is raised BMI.

suggests that criteria for referral were not based upon the evidence relating to the health need of individuals, but rather upon the availability of resources.

"I think it's because the great volume of people who are under consultant led care, they are trying to reduce it. So with the new guideline coming out shortly. Up to 40. Change it from 35 to 40." (Manager Unit 6)

"At the moment he probably would see them over 35 just to make sure. But there is an awful lot of ladies who are up there now anyway and they are thinking that perhaps we need to take it up a bit more, because otherwise the amount of work again, particularly in this neck of the wood, they are big ladies you know." (Manager Unit 9)

One participant was able to justify this shifting of criteria by suggesting that these women needn't be classed as high risk, and that they could achieve normal deliveries, without complications.

"We've changed it [criteria for consultant led care] because initially it was 30 and then we realised there were so many women who were healthy enough with a BMI of 30 and then they put it up to 35 and then again well we thought there are an awful lot of these women with a BMI of 35 who are going to have perfectly normal pregnancies, so they put it up." (Manager Unit 5)

Two managers made direct reference to a lack of funds that was affecting resources and maternity service provision.

"NHS wise there just isn't the money for that. Even things like parentcraft⁵ has been reduced, doing just one session here in town, where they used to do it in small satellite hospitals, and GPs surgeries and they have reduced that to just here." (Manager Unit 11)

"I know that [name] did a lot of work quite a few years back to engage with a dietician, But unless it was funded they wouldn't get involved. And we just couldn't afford to fund it. It's money at the end of the day." (Manager Unit 8)

A lack of equipment was also highlighted as being problematic for the delivery of appropriate care for obese women.

"So that's the only times that they get weighed. Unless we've got an issue of someone who has a large BMI above 46 because, if no sorry it's above 50. because using beds and things like that. Because we need to, it's for the equipment because our beds only take so many kilo's." (Manager Unit 5)

⁵ Parentcraft: Antenatal classes provided by the health board that gives information to parents-to-be on preparing for birth as well as infant and self care.

“Because we had a lady not so long ago you know I think her BMI was 66. She ended up having a section. So you think, oh. You know. Worst nightmare. And she was absolutely fine and you think. Well thank goodness. And yes, the protocols had been met but. Few little problems, just at the end you know, because of things that didn’t fit. BP cuffs, beds.” (Manager Unit 9)

“Because we have to order in certain beds for certain weights you know. If a lady is having a section, we don’t have our own specific beds. So we have to order them in and hire them at a daily rate.” (Manager Unit 10)

Not only were the stretched resources of the NHS highlighted, but also participants recognised that the resources available to individuals could be limited. A few managers, mentioned financial constraints as impacting upon women’s ability to access services and affecting their ability to maintain a healthy lifestyle.

“Cause you could send someone to Slimming World who could pay for it, somebody who... they say that your more at risk of becoming obese if you’re on the lower social scale. And they are the ones that can’t afford to pay, isn’t it.” (Manager Unit 2)

“The ones that really need it are the ones that couldn’t really afford it, and those are the ones that are not eating as healthy as they should because they don’t have the finances to do it. I mean. Even giving them the Healthy Start, tokens⁶ and things like that. I don’t think it’s really enough for them.” (Manager Unit 5)

“I think that it’s quite a socially deprived area as well, and then when you think oh. You know then they are not eating the right sort of things are they? They are not looking after themselves and they are not. So that’s probably why.” (Manager Unit 9)

Some managers were based in Units which served a rural community and one manager noted that those women constrained by finances and without their own transport had particular issues in accessing services.

“I suppose, some of our really obese ladies are like grand multips⁷, and live in areas with transport issues and that. It’s quite an odd area. There are little enclaves with very poor social housing, and transport is really poor... So they would need to sit on a bus for an hour and a half with 4 children. Which isn’t feasible really is it? They wouldn’t have a car or things like that.” (Manager Unit 11)

One manager highlighted time constraints as also being an issue when it came to

⁶ Healthy start: vouchers for milk, fruit and vegetables for those pregnant women on low incomes and in receipt of benefits such as income support.

⁷ Grand multips: women who have given birth >5 times.

women's ability to access resources.

“So although we're giving them the information, there are lots of reasons why I think women don't come. I don't think that it's purely that they are not interested in losing weight. I think it life, takes over doesn't it? Particularly if you've got other children..... So I think the lead has to come from the women. I do think we have to be proactive because I did say to you earlier about women who just can't fit it into their lifestyle.” (Manager Unit 8)

2.2.2.2 Knowledge

'It's amazing what people don't know'

Another theme that appeared frequently within the interviews was that of knowledge. This theme can be divided into two areas; women's knowledge and midwives' knowledge. Some managers were clear that they felt that women lacked the knowledge with regards to achieving a healthy lifestyle and often they would try to educate them.

“So we do do things like meal plans that we have done with the dietician. Because often, isn't it. You know you're discussing what they eat and what they eat for their main meals and we've done some healthy eating. Sort of like lunches, breakfasts and evening meals that we've done, that we give out. Also you know the plates[referring to the Eatwell plate] as well. have you seen?” (Manager Unit 6)

“You start talking about, you know, taking sugar in and it's amazing what people don't know about what's got sugar and carbohydrate in it.” (Manager Unit 1)

This manager recognised that the diet of childbearing women had changed and felt that the service was slow to respond in providing relevant information regarding diet, making specific reference to the leaflets that were distributed to all service users:

“I have leaflets in front of me of what is given out. And my own personal opinion is that it's terribly outdated. There are things talking about Horlicks and condensed milk. And I think we should be revamping the whole thing. And talking about ready meals and carbohydrates and takeaways and things like that. So I just think there's a lot to be done on diet”. (Manager Unit 1)

One midwife felt that healthy eating should be taught to expectant mothers and that this could be incorporated into the existing parenting education service.

“But we have been looking at setting up a healthy eating group and incorporating into parent craft as well. We thought that perhaps we wouldn't sort of say it was healthy eating, but perhaps incorporate it into parent craft for those who particularly needed a bit of advice on healthy eating really.” (Manager Unit 6)

It is interesting that the manager felt it was important to not identify this as a healthy eating class, but instead to brand it as a parentcraft class⁸, suggesting that it might have been necessary to mask its true purpose. Others favoured a more individualised approach providing information and advice to those who actively sought it.

“We speak to them on an individual basis we don't actually give them information. It's just on an individual, if they speak to us about it. And if we have someone who has a large BMI and in this area we class a large BMI as over 40, and then we start to talk to them about healthy diet....And you do get women that will say to you “right. Um I know I'm overweight but what should I be eating?” And it's just talking to them about healthy eating more than anything.” (Manager Unit 5)

This manager clearly felt that it was up to the individual to ask for advice on having healthy lifestyle, although if women were obese that advice was given unsolicited.

Some Antenatal Clinic Managers felt that providing adequate health promotion during pregnancy could have a positive influence on future pregnancies and the wider family.

“We've had two men who've come along with their partners. And their wives have insisted that they get weighed. And a doctor came along when she was pregnant, she brought her husband. And she says they are eating much better and he's lost weight. Well she's cooking you know healthier food and he's eating it, so. You know making jokes; he has to do his belt up a little bit tighter. But because they are eating as a family.” (Manager Unit 8)

“What I wanted to do was maybe do like a recipe board or a recipe for the week. A healthy recipe so that they could come in and they could see it and they could pick it up. And say “oh I'll try that then”. So that through the pregnancy as they come they could build up a lot of recipes then, and then that would be with them for the rest of their life”. (Manager Unit 5)

One manager felt that health promotion should be tackled prior to pregnancy, starting during childhood as part of the educational programme within schools.

“All these things come from health education from an early age don't they? I don't have children, so I don't know what is taught in schools nowadays. But it's almost an issue that should be

⁸ Parentcraft: See footnote 5 on page 78

introduced as children. And then perpetuated on really. But like with a lot of things, it doesn't." (Manager Unit 11)

Two Antenatal Clinic Managers felt that women did not lack knowledge regarding what was a healthy diet and what was considered unhealthy. These midwives recognised that eating behaviour is not solely about knowledge and that there may be reasons other than a lack of understanding that causes women eat an unhealthy diet.

"You know this does come up quite a lot. And you talk to them about what you're eating and things. On the whole, I think I've had a few people request help yes. But on the whole I think they think they do know how they should be eating. You know I don't think I've met anyone who is totally ignorant that they are eating the wrongs things they always turn round and say yeah well, I know I'm eating the wrong things." (Manager Unit 1)

"But you will find that women who have a weight problem, they are quite tuned in to their children's diet. And will often find that they will cook different things – this is something that's come back to me; making sure that their children are fed healthily." (Manager Unit 8)

Several midwives recognised that at times they felt ill prepared to provide dietary advice to women, due to a lack of knowledge and training in this area.

"But I don't feel as midwives we are equipped with enough information. I certainly don't feel as if I am." (Manager Unit 7)

This was particularly evident when the participants were asked what advice they gave to women regarding gestational weight gain, and with a lack of clinical guidance the midwives felt they were in a difficult position regarding what they should be advising.

"And it's quite hard. Because in health care you know, we like to have limits so we know what we're doing don't we? We like that don't we. I guess because it makes management easier. Because otherwise it becomes subjective doesn't it?" (Manager Unit 2)

"... I have seen them bringing leaflets to me to say "the person that's running my slimming club wants you to see how much I should put on" Which sort of puts the onus on us, which can be sort of difficult. There's no guidelines on what's appropriate. And I usually say to them that I would just rather see you eating healthily than think about what your weight gain or your weight loss or whatever is going to be. As long as you're eating healthy that is going to maintain you and the baby then that is fine. And I think that's all really we can say." (Manager Unit 5)

Others felt that their lack of knowledge stemmed from inadequacies within their original midwifery training.

“And you know, perhaps it's part of our training as well. Do we have enough about health promotion? And you know. You think how important it really is. But really perhaps not enough emphasis is put on that.” (Manager Unit 6)

“Cause I don't think in my midwifery training I can't remember having any specific training on weight gain in pregnancy.”(Manager Unit 7)

One of the managers suggested that giving advice when midwives had a lack of knowledge may do more harm than good and therefore identified that training of qualified midwives was required.

“Am I putting her at risk in any other kind of way by making her obsessed by what she's eating so she won't eat and then, but she's pregnant, she needs to eat. I haven't got enough knowledge to. So I guess that that's what I would want, first and foremost. Money no object, staff trained to know what is appropriate.” (Manager Unit 7)

This manager felt particularly uncomfortable about being unable to give answers to my questions with regards to how women were counselled about their weight during pregnancy;

“It's horrible actually to talk about because ...if you were coming to talk about something that I know we do, and whether it's right or wrong, this is what we do. But this is an area which really, apart from managing the problem. I've never really thought that hard about it.” (Manager Unit 7)

The Manager from Unit 4 felt that not only were the women reluctant to discuss the issue of weight but she also recognised that without knowledge, midwives' confidence in broaching the subject of weight was affected.

“No. they [the women] seem to just not want to talk about it really. And they don't. It's difficult. I think they just want it to go away really. I think that unless we're confident in discussing it with them, then. I don't think we can really start that can we.” (Manager Unit 4)

Although many Managers felt ill equipped to be advising pregnant women regarding their diet and gestational weight gain, they seemed to have less concern about discussing exercise during pregnancy and perhaps this is because exercise is seen as being less socially sensitive.

“We do aquanatal classes so we're trying to encourage women to participate in those. And we also give out leaflets on what

exercise is appropriate for women to do and which ones aren't in pregnancy. And obviously, what we're looking at, is where they are at exercising, because some women will be doing a lot of exercising anyway beforehand, You know, and we're talking to women about what exercises they do and how much exercise they do and a bit about what's appropriate in pregnancy".
(Manager Unit 6)

Often the midwives would talk to women about exercise in terms of safety and avoiding risk.

"I think they talk about exercise in general, because they ask what they do for exercise. A lot of ladies will have questions where they are about stuff like horse riding, to see if it's safe".
(Manager Unit 11)

Some Managers felt that commencing an exercise programme during pregnancy was something to be avoided and instead steered women toward more gentle and what they considered to be more appropriate forms of exercise.

"It's part of the initial booking where we talk about aquanatal exercise and not to just all of a sudden go to the gym because you're pregnant [laughs] which some people do do." (Manager Unit 5).

"And obviously you know, some women are very concerned about weight gain aren't they. And perhaps don't do much exercise and they decide well we're going to exercise throughout this pregnancy. And so we're saying well that's not a good idea. If that's not what your body is used to doing". (Manager Unit 6)

So although the midwives could see that for some women, pregnancy provided an increased motivation to commence exercise, it would seem that rather than encouraging them, they were inclined to dissuade the women from commencing new forms of exercise.

2. 2. 2. 3 Communication & Support

'..feel secure, supported, knowledgeable, empowered'

The supportive and trusting relationship that midwives can develop with the women for whom they care was evident during the interviews and in one case showed itself quite clearly when it came to the sensitive issue of being weighed:

"There are women who feel that they, you know "look I know I'm overweight" And they get really self-conscious if you have to put

them on the scales. [Whispers] "Don't tell anybody what I weigh".
(Manager Unit 5)

Others also recognised the importance to women of a good mother-midwife relationship that can support them during their pregnancy. At the heart of this appeared to be the midwives' ability to communicate effectively, passing on information and assisting the women to understand about what to expect from the care they receive.

"...because once you've got this contact they feel secure, supported, knowledgeable, empowered. Because they know exactly what to expect, we do regular walks, you know walks around the unit, so. They are very familiar with the unit and very familiar with the clinic staff in particular."(Manager Unit 8)

"And then explaining to them again, why we offer the Glucose Tolerance Test⁹; because you are at a greater risk of having gestational diabetes. And once you explain it to them making sure they know the reasons why and the reasons behind it. That they say, right I'll accept it then, right that's what they do."
(Manager Unit 5)

It was recognised that pregnancy was seen as an ideal time with which to address the issue of weight with women.

"And really, pregnancy is a time when often you can capture people, can't you? Because they're thinking of their baby and the health of their baby." (Manager Unit 6)

Although one manager noted that those women who had issues with their weight, appeared to be reluctant to talk about getting assistance with dietary behaviours. She felt that this might be because the midwife was seen as dealing with the pregnancy and growing fetus and not about the wider health issues of individuals.

"I would have thought perhaps as health professionals, that people might have asked for help a bit more. But they don't seem to ask us. And possibly they just see us as, perhaps, midwives and just dealing with the pregnancy and not dealing with the bigger health issues, I think that could be part of it. Perhaps we need to advertise a bit more.But perhaps we need to be talking, perhaps it's our fault that we don't talk enough about health issues." (Manager Unit 6)

This response is interesting as she recognises that maybe midwives need to be more proactive in discussing wider health issues, especially as it would appear that women may be reluctant to broach the subject fearing it may not be part of the midwives' role.

⁹ Glucose Tolerance Test See footnote 4 on page 75.

Others felt that broaching the topic of weight management with obese women may be difficult for midwives, fearing it may cause offence or negatively impact upon the midwife-mother relationship.

“Whether it’s because the first meeting they don’t want to broach the subject, because if you’re trying to build up a relationship with someone, the last thing you want to do is say we’re running this group for increased BMI” (Manager Unit 8)

“Where the medical view is like “Oh you’re over weight. We are going to do this, that and the other for you. We’ll let the dietician talk about your weight. And we will do a GTT and then we will scan you and then we can make you feel bad about being fat!” We’re turning it into the new smoking!” (Manager Unit 11)

The above manager felt that the way in which obesity was being managed within maternity services left the women feeling guilty and equated it to cigarette smoking.

Drawing comparisons to other campaigns used to alter behaviour was not limited to the above quote, as one participant compared it to environmental issues. She was suggesting that a negative approach with an over emphasis on obesity may cause women to ignore the issue due to a possible over saturation of message.

“And making it more positive. Cause I think at the moment it’s a bit like the green thing, you know. People are getting a bit tired of it all. Almost as if, well that’s the way it is and what you going to do about it sort of thing.” (Manager Unit 10)

When asked about services that the managers would like to be implemented for women who are overweight or obese, several midwives felt that there was a strong case for peer support. They suggested that this approach would assist the women to build relationships with other pregnant women in the same situation and to have common goals and provide support for each other; it would also leave the women feeling less singled out.

“And basically have a clinic designated for them [overweight/obese women], that has all the signposting to all the different activities within the community and all the help that they can they can get from us. And a support site really. You know so that they can get support from their peers.” (Manager Unit 4)

“It could be fun. Get together, and “oh let’s try this tonight” And try and talk them through things with them, you know, what’s healthy to eat. And if you get them altogether it’s like going to a slimming club, isn’t it? If there’s more people you don’t feel individualised. You’ve got that; everybody together, who’s larger and pregnant and we can all have a laugh and a joke and eat healthy and things.” (Manager Unit 5)

“In the perfect world it would be lovely to have something like that, a support group. Where everyone’s there, you know they are all pregnant, they are a bit over weight, they’re all in the same pickle isn’t it?” (Manager Unit 2)

The unit that provided a specific support group which included dietary advice and exercise classes for obese women, found that this group was welcomed by those who attended.

“It was just getting to know the women and supporting them. And they have had a great experience. That’s come back to me clearly. Yeah, it is rewarding...But there is that rapport there. They feel well supported; they’ve got a lot of anxieties, but still feel they can ring us at any time. And I think that’s positive. That’s a good way.” (Manager Unit 8)

She believed that a positive relationship with midwives actually helped the women with their weight management, as these women were keen to reciprocate the effort put in by the clinical staff by working hard towards limiting their gestational weight gain.

“Women almost want to do well for you, because they can see that you’re there and you’re putting a lot into it. And it is reciprocated from women in that they feel they want to do well, and they don’t want to come in week after week having two or three pound weight gains” (Manager Unit 8)

It would appear that these women felt that because their health and wellbeing was seen as important to their midwives in return they too valued the healthy eating goals and were able to manage their weight accordingly. However the manager recognised that this service would not necessarily be suitable for everyone, and that actually, attending a group may be seen by some as an intimidating experience.

“For some women a group setting. And I’ve had women come along and say, ‘this just isn’t for me’. They don’t like the idea of sitting down with another group of women and talking about food and. It might well make them explore issues they don’t want to explore thank you very much.” (Manager Unit 8)

And so although she acknowledged that some women did benefit from the group environment, with support from both their peers and midwives, others may do better in a less public setting:

“I think it’s been proved that women like the contact with a midwife, a health professional on a regular basis. They feel supported. But we have to provide that support in an arena that suits women whether that’s with a weekly one to one or in a group at various times as well.” (Manager Unit 8)

2. 2. 2. 4 Weight and vulnerability

'Making them feel pressured in an already pressured situation'

It was apparent that the managers felt that certain groups of women were particularly susceptible to overweight and obesity. Women in areas of economic deprivation and also young teenage mothers were noted as being especially vulnerable.

"I suppose, some of our really obese ladies are like grand multips¹⁰, live in areas with transport issues and that. It's quite an odd area. There are little enclaves with very poor social housing, and transport is really poor." (Manager Unit 11)

"I think that it's quite a socially deprived area as well, and then when you think oh. You know, then they are not eating the right sort of things are they? They are not looking after themselves." (Manager Unit 9)

"What we looked at was age as well and there's a lot of teenagers coming through with large BMI's as well. Which was a bit worrying really. (Manager Unit 6)

A few managers recognised that some women may be emotionally vulnerable particularly when it came to their weight.

"I know it's important in pregnancy. I know that. But obviously they are pregnant now, and they've got to deal with. I wouldn't want it to be seen that you were pushing at an already difficult time for them, you were suddenly making them feel guilty. Making them feel pressured in an already pressured situation." (Manager Unit 7)

"And there is the aquanatal classes which are offered to women. But sometimes when women are larger, they feel more conscious you know. And they maybe might not want to go to the swimming pool." (Manager Unit 2)

"We had one referral letter where the GP had said please don't make weight an issue for this patient during her pregnancy she realises she is overweight, and she doesn't want to be constantly reminded about it. So this woman had obviously, not got mental health issues, but has clearly got emotional issues and didn't want the focus of the whole pregnancy to be on the fact that she was overweight." (Manager Unit 11)

The above quote is interesting and would suggest that the GP felt the need to protect

¹⁰ Grand multips: see footnote 7 on page 77

the pregnant patient from a negative medicalisation of her weight. This view was shared by some managers who were also keen not to pathologise women identified as overweight or obese, they recognised that having a large bodyweight did not necessarily imply that they were unhealthy.

“And when you talk to some women who have a BMI of 35- 40 they may eat quite healthily anyway. Isn't it you know. And it doesn't mean to say that they are not healthy does it?...I had one women a couple of weeks ago who was quite perturbed by the fact that she had to be under consultant led care because she wanted a home birth as well. And I think her BMI was about 37. And she said, well I eat healthily, I do plenty of exercise. I've never been in hospital, I've never been to my GP with any medical problems. So why do I need to all of a sudden be consultant led?” (Manager Unit 6)

A number of managers indicated there could be a role for midwives in supporting or safeguarding normality for those women with a raised BMI.

“Should we be looking at them individually then? Instead of looking at what their BMI is should we be looking at their lifestyle? Or should we be looking at how fit and healthy they are. You can't just say that because someone is bigger that they are high risk.” (Manager Unit 5)

“Now there are lots of ladies around the 35 or slightly over who are very capable of having normal deliveries, so they are not disabled because of their weight! So I think we need to do something more about normality and keeping that group of women who are not strictly low risk but they aren't high risk either with loads of medical complications, just a raised BMI.” (Manager Unit 10)

This manager could see that it may be possible for midwives to empower these women to be more proactive in labour and in doing so assist them to achieve a normal birth.

“And show them the importance, you know you are more likely to deliver normally by keeping upright and moving. Especially if you are on the bigger side, the last thing you want to be doing is lying on the bed.” (Manager Unit 10)

During the interview three managers mentioned their own issues with weight and how they felt this impacted upon the care that they were able to give women. One felt that due to her size, she may be seen as hypocritical when talking about managing weight.

“.. they can see me and you know they say “well who are you to tell me” because they can see that you're overweight “and you're telling me what's supposed to be done”” (Manager Unit 5)

Another manager recognised that some women would find it difficult to manage their weight on their own without the assistance of a health professional, she identified with these women and drew comparisons with her own weight issues.

“I mean I’ve got a raised BMI myself. And I would so like to have, to be able for my health for a practitioner, my GP to be able to more actively help me with that yeah? Rather than me having to motivate myself...” (Manager Unit 7)

One midwife who had a history of issues around her own bodyweight felt that it put her in a position to advise other health professionals in the way in which they discussed weight with women; recognising that weight is a sensitive issue that needed to be handled gently so as not to cause undue anxiety.

“I said “you want to be careful about who you talk to, and how you do tell people that they are overweight”. Because she might be talking to a reformed anorexic! And you might sort of push them back into that sort of way. And she said “what a load of rubbish”. And I said. “Well I used to be 7 stone and now I’m not. And I don’t want to go back to obsessing about being really thin. And I know I’m overweight now, but I’m happy now. So please be very careful, because there could be other me’s out there”. And there could be other people who don’t want to be forced into fitting into a neat little box with a number on it.” (Manager Unit 11)

2.2.2.5 Risk

‘...that is for health and safety’

It is evident through the interviews that the topic of risk was prominent and it appeared to run through all the other themes. This may have been due to the professional coverage of the findings of the seventh Confidential Enquiry into Maternal and Child Health (Lewis, 2007), which identified obesity as being associated with maternal death. Therefore when the managers were asked about what care was provided for women with a raised BMI the responses tended to be risk management related with an emphasis on the clinical management and not necessarily what women themselves could do to reduce risk:

“ Not ignoring the fact that they are overweight. Dealing with the risks,, rather than addressing with them how to reduce the risks and maintain their weight.” (Manager Unit 7)

The above quote would indicate that this manager recognised that there appeared to be a degree of ‘fire-fighting’ and not necessarily looking at prevention. Indeed, many of the midwives demonstrated a medicalised management of the issue of obesity, where women required close monitoring. For instance they identified the need to carry out glucose tolerance blood tests (GTT) to identify those obese women who develop gestational diabetes.

“All our ladies with a BMI of 35 or over also get a glucose tolerance test because we are seeing a huge increase in that as well.” (Manager Unit 1)

“I’ve got to say, sometimes if they are quite close to the [BMI] cut-off [for consultant led care], we tend to maybe putting them in just in case. Because they are the ones that will end up with a GTT” (Manager Unit 9)

The response from the manager of Unit 9 shows that even when a woman is below the BMI criteria for Consultant review they may still be referred as a precautionary measure. Perhaps this demonstrates that this manager mistrusts the notion of ‘normality’ and that sees the potential for pathological development in women identified as low risk.

Referral to anaesthetic colleagues when a woman is identified as obese is recommended practice and forms part of a risk assessment procedure:

“We do have a policy here for women with a BMI above 40 that they see the anaesthetist. Again that is for health and safety and for the anaesthetist to have a look and check if they do have to have an anaesthetic for any reason that it is going to be safe.” (Manager Unit 5)

“If their BMI is 40 and above they would have an anaesthetic review. If they are multigravid¹¹ and have proof of a previous normal delivery, they don’t. (Manager Unit 2)

The response from the manager from Unit 2 is interesting as it appears to suggest that women need to demonstrate that they are capable of achieving a normal birth in order to avoid being viewed as “problematic” and in need of anaesthesia.

¹¹ Multigravid: A woman who has previously given birth.

2.3. Discussion

As per the antenatal clinical recommendations (NICE, 2008), at the time of interview all Health Boards involved in this study had a policy to weigh and measure the height of women early in pregnancy in order to establish their BMI. Those women identified as having a raised BMI were referred for obstetric review; however the BMI criteria for this review varied from unit to unit. There was a great deal of variation across Wales, in the provision of specialist services to women with a raised BMI. The availability of dieticians meant that some units were able to refer women for specialist dietetic and nutritional help, whilst others were not. The BMI referral criteria for review by anaesthetists also varied across the country.

Two of the Health Boards provided a specialist service for women identified as obese which included weight management and nutritional support with the aim of limiting gestational weight gain. Both these units had in place a senior midwife specialising in obesity. Six months after the interviews took place, CMACE reported on the findings and recommendations following a national survey of maternal obesity in the UK (CMACE, 2010). They recommended that women identified as having a raised BMI should have access to routine care that is supplemented by specialist services and facilities to meet their needs, including midwives with a special interest in obesity. So it would appear that two of the Health Boards were already providing this type of specialist service.

From these interviews with the Antenatal Clinic Managers, it is apparent that many of them see pregnancy as a key opportunity for midwives and other health professionals to promote public health messages regarding diet and physical activity, and that it can have wider implications than for just the individual involved. This supports the literature which recognises that changes to lifestyle made during pregnancy can positively influence the long term health of women and the family as a whole (Oken et al., 2008, Olson et al., 2008). Yet it was clear that a lack of finance and resources available was seen as a barrier by the managers in the provision and access to specific resources, especially access to dietetic support.

All of the managers felt the issue of obesity was a growing concern within maternity, with many seeing a rise in the number of obese pregnant women in recent years. The managers felt that this rise in obesity rates put an increasing burden upon already stretched services. With limited resources available, the criteria for referral to specialist services was based not upon the needs of individuals but rather upon the availability of

resources. These Health Boards are not alone in needing to increase BMI cut off points for specialist referral due to a rise in numbers of obese women. This finding was also noted by a study which looked at the impact of obesity on maternity NHS services across Britain (Heslehurst et al., 2007). They too identified that criteria for referral to specialist services was being altered due to difficulties in meeting the demand for services. This scoping study and the research by Heslehurst *et al.*, (2007) demonstrate the real impact that a rise in rates of obesity within maternity is having upon the provision of specialist services to women.

The managers also noted that limited resources were not just a concern for the health providers, but that women may also have limits upon their time and finances which has implications regarding their access to appropriate services.

There was a degree of ambivalence regarding the midwives' views on women's knowledge of a healthy diet, with many feeling that women were unable to eat healthily due to a lack of understanding of basic nutritional messages. Some felt that the information being provided was outdated and not relevant and therefore needed revising. Others felt that an educational programme may assist women to make healthier choices. However, there were a number of midwives who felt that a lack of knowledge was not the problem, and that many women who had issues with their weight, understood the differences between a healthy and an unhealthy diet, but that there were other mitigating circumstances that led them to eat unhealthy food.

A view that there were deficiencies in knowledge regarding healthy eating and nutrition was not limited to the pregnant women. The managers also noted that they felt there was a lack of information and appropriate training for midwives especially on the topic of gestational weight gain and that this led to a lack of knowledge which may cause midwives to be reluctant to discuss diet with women. This finding was also noted by other researchers (Olander et al., 2011, Heslehurst et al., 2012). Olander *et al.*, (2012) identified that a lack of guidance in this area left health professionals in a quandary as to what advice they should be giving women about gestational weight gain.

Similar to the study by Heslehurst and colleagues (2012) which looked at health professionals' views of raising the topic of obesity and weight management, the managers in this study felt that midwives may be reluctant to broach the topic due to not wishing to offend the women or negatively impact on the midwife-mother relationship.

It would appear that although midwives may feel that pregnancy should be considered an ideal time to address issues regarding a healthy diet and weight gain, in the

absence of knowledge and appropriate training in this area they lack confidence. Coupled with issues regarding their own weight and also not wishing to offend women, the topic may end up not being broached, thus placing the onus on the women to raise the issue if they feel able to do so.

It was clear that the Managers felt more confident about discussing physical activity during pregnancy with women. The majority discussed this in terms of safety and 'appropriate' activity and several suggested that women should not take part if they had previously not been engaged in exercise, this contradicts the current UK advice being given that encourages health professionals to advise all women to commence a regular programme of physical activity, even if they had led previously sedentary lifestyles (RCOG, 2006). Perhaps this focus on appropriate exercise and hence conversely implied anxiety about inappropriate exercise during pregnancy may in some instances be passed on to pregnant women and lead them to believe that no exercise may be a safer option than commencing activity, especially if they had previously been sedentary. This view of exercise being seen as risky might serve to quell the increased motivation that pregnancy may give some women to become healthier by increasing their activity levels during pregnancy.

Social support has been identified within the literature as important in maintaining a healthy diet, and partners are thought to be the most influential in this area (Tovar et al., 2009, Thornton et al., 2006). However, when asked about what services they would like to see being provided for women with a raised BMI, it was peer support that was mentioned by several midwives. It is unsurprising that partners/husbands were not identified as possible agents for change, as midwives provide care predominantly to women and their new-born infants and the role that midwives play in providing a service to their partners tends to be very limited. Managers did report that they thought overweight or obese women may find a support group of benefit through providing solidarity with women in a similar situation. They suggested that this camaraderie may leave them feeling bolstered and less singled out although it was recognised that this may not be universal as some may find one-to-one sessions a less intimidating experience. There is research which supports the efficacy of support groups in weight management. Renjilian and colleagues (2001) identified that group treatment improved weight loss in overweight and obese participants when compared to individual treatment and interestingly they noted that this was still the case even when the individuals had stated a preference for individual therapy (Renjilian et al., 2001). However it could be argued that individuals would have to maintain a high degree of motivation in order to commit to regular attendance at support groups. Women with

competing demands on their time from work commitments and young children may find this level of commitment especially challenging.

A few midwives felt that classifying pregnant women as high risk due to their BMI alone, negatively impacted upon women's experience, and may leave them feeling vulnerable and scared at a time when they should be feeling excited and looking forward to motherhood. Several felt that it was important to actively promote 'normality' to this group of women to reduce the risk of unduly pathologising them and enhance their experience and provide them with an opportunity to have a normal birth despite their BMI. This viewpoint may stem from a professional drive to reduce medical intervention and promote normal birth for women, a stance that can be seen in the Royal College of Midwives 'Campaign for Normal Birth' (RCM, 2010a).

Having personal experience of overweight has been shown to have an impact upon the way in which health professionals manage women with obesity in pregnancy, and how they broached the topic (Brown and Thompson, 2007), and this would appear to be supported by some of the managers within this study. Rates of overweight and obesity within nursing and midwifery professions have been identified as above those than is found in the general population (Bogossian et al., 2012), and if being overweight or obese makes health professionals less inclined to discuss the issue of weight, this will inevitably have implications for the public health role of the midwife. The Welsh Government in its strategic document aimed at improving health outcomes recommends that NHS staff should be equipped with necessary skills and competencies to make 'every contact count' in supporting and encouraging people to stay healthy (Welsh Government, 2011a). There have been other key documents that have emphasised the public health role of the midwife which is now recognised to be a major component of the job (RCM, 2010b, NICE, 2010a, Welsh Government, 2011a). This increasing sphere of practice within the midwifery profession will inevitably bring in the need for staff training, and it may therefore be necessary to take into account the particular training and support needs of midwives who are tasked with encouraging healthy lifestyles behaviours, who themselves have personal issues with their weight.

Whilst the topic of the weight management of overweight and obese women was included in the interview schedule to establish what, if any, services were available that related to the diet and physical activity of this population, it was evident that every aspect of dealing with weight gain across all BMI strata was seen as influenced by a level of risk. Both diet and physical activity behaviours were framed in the concept of risk leaving midwives reluctant to address diet or to encourage commencement of exercise. It was noticeable that nearly every aspect of dealing with obese women was

seen as being influenced by a degree of risk. This may be due in part to the CEMaCH publication which identified the high numbers of obese women who died during pregnancy (Lewis, 2007). Since that publication obesity in childbearing has received considerable attention with numerous reports and research being conducted in this area thus raising the profile within the profession, so this finding is unsurprising. Midwives are the lead professionals responsible for those women with uncomplicated pregnancies, yet in screening women to see if they can be considered suitable for midwifery led care, they are looking to see any indication of deviation from the norm that requires obstetric review. So although midwives are concerned with the promotion of normality (RCM, 2010a), paradoxically their role requires them to be focused on identifying a development of risk in order to prevent adverse outcomes and this has been noted by others (Scammell, 2011, Fraser, 2003).

Although midwives are frequently reported as viewing childbirth as a normal physiological process (RCM 2010), it is clear that more and more women are entering pregnancy overweight and obese. This inevitably means they are viewed not as 'normal' but as being at increased risk of complications, thus requiring additional care and referral to other health professionals. If midwives view these women as 'high risk' does this not have implications for the women in how they themselves view their pregnancy? If health professionals are overtly labelling women as high risk is this not suggesting to the women that they are incapable of having a normal birth, and undermining their sense of self efficacy? There would appear to be the need to balance the prevention of complications against the suggestion that these women will automatically have problems and undermine the confidence of these women in being able to bear children without intervention. It has been shown that for women whose risk of pregnancy complications is elevated, having an optimistic outlook is beneficial (Lobel et al., 2002). This would suggest therefore, that health professionals involved in the care of obese women, who might view these women as being high risk should support them to view childbearing as a positive normal process and encourage optimism and in doing so facilitate self-efficacy.

A strength of this study is that the entire population of antenatal clinic managers of large obstetric units across Wales were invited to take part in this research, and all but one eligible Health Board consented to participate. This has meant that the findings provide an insight into the policies and protocols across the country as a whole. However it should be noted that there may be inconsistencies between what care should be provided as set out by the policies and what care is actually being provided by health professionals working within the units. As this is qualitative data care should

be taken when generalising findings. This is especially true if applying findings to outside Wales, although several similarities in the findings have been identified to studies which have taken place in other parts of the UK (Olander et al., 2011, Heselhurst et al., 2012). A limitation of this study could be seen as the timing of data collection. As already discussed, these interviews took place just after a period of significant reorganisation to the structure of the NHS in Wales, with Trusts merging to form larger Local Health Boards. Inevitably this will have impacted upon the policies and protocols as new Health Board wide documents were in the process of being developed, therefore the findings can only provide a snapshot of the clinical practice at the time of interviews, and these policies may well have changed since then. It should be understood that this study aimed to collect data to set the context, and identify what policies and protocols were in place for each unit. It did not seek to identify what each individual practitioner advises; rather it provides contextual insights into the unit's recommended practice/policies which are intended to underpin practice.

This study has provided an overview of the antenatal management of weight and weight gain across Wales. The advice being given to all pregnant women appeared to be limited to the information contained within the Pregnancy Book. Further, discussions relating to recommendations about diet, exercise and physical activity were not covered by unit policies or protocols and were therefore left to the discretion of the individual midwife. Pregnancy specific exercise classes available to women were very limited and indeed some units were unable to provide them.

These interviews also provided an insight into the barriers that maternity services face regarding the provision of services for obese and overweight pregnant women. Although many of the managers felt that more should be done for this group of women, they were frustrated due to a lack of resources and access to adequately trained health professionals. Many of the managers felt that additional appropriate midwifery training regarding the advice midwives should be giving about gestational weight gain and diet may assist women to make healthier lifestyle choices. They also noted that any discussions with women on this sensitive issue should be handled with care so as not to offend or negatively impact on the midwife-mother relationship.

So how do women feel about the care and advice they receive from their midwife regarding weight gain during pregnancy? How is gestational weight gain viewed by women with a raised BMI and does this have implications for their behaviour? Study one has explored the views of midwives regarding the antenatal management of weight and weight gain and advice given to women. The next chapter looks at study two which sought to explore the woman's perspective.

CHAPTER 3.

STUDY TWO: WOMEN'S EXPERIENCES OF MANAGING PREGNANCY WEIGHT GAIN.

Introduction

Monitoring of weight gain during pregnancy by clinicians is not currently advised and instead emphasis is placed on the importance of pursuing a healthy lifestyle rather than focusing on weight gain per se. As discussed in CHAPTER 1, some weight gain is expected as part of a healthy developing pregnancy and although the amount gained varies considerably from woman to woman, a total weight gain of 11 kilos at term is typical (Tse and Macones 2009). Weight gained above and beyond this may be healthy and 'normal' for that particular woman, or could be due to pathology such as oedema. However, high amounts of weight gain can also be due to increased body fat as a result of unhealthy maternal lifestyle behaviours (i.e diets that are high in fat and/or sugar and low levels of physical activity) (NICE, 2010d). Hence in the UK the focus is placed on healthy lifestyle behaviours so that if a large amount of weight is gained, it is due to something other than unhealthy modifiable behaviours. Indeed the recommendation from Government and health professionals is clear: during pregnancy eating a healthy well balanced diet that is not too high in fat or sugar and staying active throughout pregnancy will ensure the best possible start for the baby (DOH, 2009d). However, what is less clear is whether pregnant women feel able to commence or maintain these health behaviours or whether they encounter barriers through the course of their pregnancy that may thwart their intentions. And there is evidence to suggest that some pregnant women have difficulty in achieving a healthy diet (COI and FSA, 2007, Verbeke and De Bourdeaudhuij, 2006, Wen et al., 2010) and maintaining appropriate levels of physical activity (Clarke and Gross, 2004, Weir et al., 2010).

Women who are already overweight at the start of their pregnancy are considered at greatest risk of gaining excessive amounts of weight (Schieve et al., 1998b, Brawarsky et al., 2005, Chu et al., 2009) and arguably may be especially daunted at the prospect of carrying more weight after the birth of their baby. Although identified by clinicians as having a raised BMI (but not classified as very obese), unlike their heavier counterparts, there are no referral mechanisms or specialist services to assist these

women to maintain a healthy lifestyle and to manage their gestational weight gain. A search of the literature found limited research investigating women's views of weight gain management during pregnancy, and none was found that had been conducted within Wales.

3. 1. Methods

This study was planned to obtain an insight into the views and experiences of overweight pregnant women regarding gestational weight gain focusing on their intentions relating to dietary and physical activity behaviours during pregnancy. A longitudinal study design was chosen as the most appropriate method for exploring women's intention and experience of gestational weight gain. Obtaining data from one time point may not have provided the degree of insight into the intended behaviour and actual behaviour of participants during pregnancy. Although longitudinal studies are more prone to participant attrition, this is less likely to occur with short-term longitudinal studies (Sanders, 2010) and indeed all participants remained in the study. Women were initially interviewed in early pregnancy and then subsequently followed up after the birth of their baby. This permitted an insight into the lifestyle intentions of these women and an exploration of the barriers they faced, through the course of their pregnancy, which may have impacted upon their behaviour.

3. 1. 1 Sample & recruitment

A person centred qualitative approach was identified as appropriate in order to gain the rich in-depth information required (McNeill and Chapman, 2005). Women attending their first antenatal clinic appointment at a large hospital in South Wales, and identified as meeting inclusion criteria by the Antenatal Clinic Midwife, were given the participant information sheet (Appendix 8) and invited to take part in the study. If interested in participating women were asked to provide contact details and were contacted at a later date by the researcher when a mutually convenient date and time was arranged for a one to one interview. For the majority of women the interviews took place within their homes, which was the preferred venue, as it was felt to be more conducive to putting participants at ease and in so doing produce more in-depth responses. Only one participant requested that the antenatal interview be conducted in her place of work, because she worked full-time she found this to be most convenient. All women

were informed of the researcher's professional status within the participant information sheet.

As identified in the literature review, women with a raised BMI are understood to be at greatest risk of excessive gestational weight gain and so participants were restricted to those with a BMI between 25-35 (Overweight and obese class 1). Arguably those women identified as being overweight may be particularly cognisant of weight gain and hence be particularly interested in participating. Healthy primigravid women (pregnant with their first infant) were targeted in order to obtain their views and expectation of weight gain without being informed by previous pregnancy experience. Recruitment continued until a total sample of 15 women was obtained. Sample size was determined with the aim of producing sufficient data whilst remaining manageable for a single researcher. Inclusion criteria were; gestation at less than 16 weeks at recruitment, age 18-40, low risk of pregnancy complications and therefore assigned to midwife led care. Although the national clinical guidelines (CMACE and RCOG 2010) suggest that women with a BMI > 30 require referral to a consultant, in the recruiting unit for this study only those women identified as having a BMI > 35 are referred for consultant led care. Therefore the sample included both over weight and obese class 1 participants. Exclusion criteria were, lack of fluency in English, assigned to consultant led care, a history of eating disorders, and pre-existing health conditions (such as diabetes or heart disease). It was planned that those women who subsequently developed health complications should remain in the study providing their health permitted and they were happy to continue to participate.

3.1.2 Data collection

Data collection for this study took place between January 2010 and June 2011, and therefore there was being carried out at the same time as the scoping study. Semi-structured one to one interviews were chosen to allow for the exploration of perceptions and views regarding the potentially sensitive topic of weight gain. Mindful of the sensitivity of the topic, carefully worded interview schedules were used during data collection (Appendix 9 & Appendix 10). Interview schedules can ensure interviews remain focused whilst the use of a semi-structured format provides the opportunity for further exploration and therefore richer data (King and Horrocks, 2010). The purpose of the interviews was to gain a detailed understanding of how women themselves experience managing their weight gain in pregnancy. This included exploration of women's views and understanding of gestational weight gain, their intentions regarding

eating and physical activity behaviours, and identification of perceived barriers that may thwart their intentions. Much consideration was given to the terminology throughout the interviews in order to prevent leading the participants. All interviews were digitally recorded so that responses to questions were transcribed in the participants' own words, and in this way ensure that the responses were authentic. Each participant was interviewed twice, once relatively early in pregnancy at between 14-18 weeks gestation and again at approximately 6 weeks following birth. These time points were chosen to enable a comparison to be drawn between behavioural intention and expectation and actual behaviour. Interview lengths varied and lasted between twenty minutes and one hour. Following the interview, recordings were transferred from the hand held recorder and stored onto a password protected computer as soon as was practically possible, prior to being transcribed by the researcher.

Women were weighed by the researcher at both time points (at 14-18 weeks gestation and at 6 weeks postnatal) to obtain data on weight and weight gain and they were informed of this procedure as it was detailed within the participant information sheet. The reason for weighing the participants was to gather some preliminary data of the weight changes experienced by participants as there is no data regarding this in the UK. At the time of development of the protocol for study two, gestational weight gain was thought to be of key importance and hence its inclusion in this study. However as the research project as a whole developed it became apparent that lifestyle behaviours were actually of greater interest. Data regarding weight gain was collected and therefore the procedure for doing so is reported. Weighing scales have various levels of precision. The scales used to measure the weight of participants were Class III Seca Scales 877 and as such were of high precision and recommended for use in healthcare as specified by the UK Weighing Federation (UKWF., 2002). To ensure accuracy of measurements, scales were placed on a hard surface and participants were weighed in light clothing having first removed their footwear.

Throughout both antenatal and postnatal interviews the term "healthy lifestyle" was used to encompass diet, exercise and weight gain. Although the area of interest was women's views on gestational weight gain, I was mindful not to suggest that this was something that should be of concern for two reasons. Firstly I did not wish to alarm the participants into altering their lifestyle and possibly cause undue stress or anxiety, and secondly because it was important not to lead participants into giving responses based on a preconceived obligation to conform. Asking leading questions is known to produce

more 'socially desirable' responses and thus may not provide a true reflection of individuals' views (Green and Thorogood, 2009).

The aim of this study was to obtain women's views regarding their diet and physical activity behaviours and as such the data gathered at these interviews were subjective in nature with no attempt to obtain an objective standpoint. It was not feasible to collect objective data relating to diet and exercise during pregnancy as it would require long-term observational work, a high participant burden and more resources and time than were available.

3.1.2.1 The antenatal interview

The first section of the antenatal interviews related to collection of demographic information such as age, marital status, employment as well as clinical information such as due date, height and self-reported pre-pregnancy weight. It provided the researcher with the opportunity to ask further questions such as "Are you going to find out the sex of the baby?", although not relevant to the research aims, questions such as these assisted in putting the woman at ease as they were encouraged to talk about their baby.

The focus of the interviews was on the lifestyle behaviours that contribute to weight gain. Enquiries were made about the woman's lifestyle prior to pregnancy with regard to diet and exercise. This allowed for comparisons to be drawn between the lifestyle behaviours prior to and during pregnancy, to see what impact, if any, pregnancy would have on their health behaviours. Questions were asked to obtain the views on what a healthy lifestyle in pregnancy meant to them with regards to their diet, exercise and weight gain. Women were also asked whether they had received any advice regarding a healthy lifestyle in pregnancy, where this advice had come from, and whether they had sought it or it had been offered unsolicited. They were also asked about their lifestyle intentions and, if changes were intended, whether they could identify potential barriers to achieving this.

3. 1. 2. 2 The postnatal interview

The preliminary questions for the second interview related to the collection of clinical data such as mode and date of birth, as well as the baby's birth weight and gave the opportunity for women to talk about their birth experience if they so chose to do so. Again, although information relating to their experience may not seem relevant to the research question, it did serve to encourage women to talk freely and openly and to establish researcher-participant rapport.

The women were then asked questions relating to their lifestyle in pregnancy, whether they had altered it, why they might have done so, and if applicable, what they found difficult and helpful.

The women were also asked about their lifestyle following birth in relation to diet and exercise, with the aim of establishing what impact pregnancy and motherhood had on certain health behaviours.

3. 1. 3 Ethical considerations

The main ethical issues pertinent to the study were: autonomy, informed consent, non-maleficence, confidentiality and professional responsibility.

Respect for autonomy is a principle that is applied to an individual's ability to 'self-govern' and synonymous with this is the issue of consent (Beauchamp and Childress, 2001). In order for possible participants to make an informed decision as to whether they wished to take part in the study or not, they were given a participant information sheet (Appendix 8). The purpose of this was to provide individuals with as much information as possible about the research study, what it involved, who was conducting it and why it was being carried out. Potential participants were asked by recruiting midwives in the Antenatal Clinic for their contact information and were advised that they did not have to make a decision then and there, but that the researcher would contact them after two weeks had elapsed in order to find out if they were willing to take part. The period of two weeks was decided as ample time to fully consider the implications of participation and also to enable them to discuss this with their family and or partner should they chose to do so. In order to prevent individuals feeling coerced into participating, the information sheet made it clear that involvement in the study

would not affect the care they would receive and they could choose to withdraw from the study at any point, without providing a reason.

If individuals decided that they would like to take part, prior to commencement of the interview, time was given to go through the information sheet in some depth. In this way any questions that arose could be answered adequately as recommended by the National Research Ethics Centre (NRES, 2011). A consent form was devised to provide written evidence of consent (Appendix 11). Three copies of this consent form were signed, one was kept by the participant, one was enclosed within the woman's maternity records and the last copy was kept by me as the researcher, as evidence of consent.

The topic of weight and weight gain is considered to be sensitive one, and so great attention was paid to the language used in both the information sheets and the interview schedule to minimise any distress to participants. The majority of pregnancies end in a positive outcome (i.e. a healthy mother and infant) however this is not always the case. It was therefore decided that following the birth, the woman's community midwife should be contacted to establish pregnancy outcome prior to re-approaching her in order to prevent an unwelcomed intrusion at a potentially distressing time. Participants were notified that their midwife would be contacted by the researcher following birth and all consented to this sharing of information.

The participant information sheet specified that should any of the participants become distressed during the process the interview would be stopped and a referral mechanism was embedded into the research proposal whereby, if required, individuals could be referred to sources of further support such as their midwife or General Practitioner. In the event, no participants became upset during the interviews, and only one required referral to seek advice from her general practitioner regarding her postnatal health.

Confidentiality was assured through the secure handling and storage of data. As a registered midwife, I was fully aware of the need to respect the right to confidentiality as one of the key elements within the code of professional conduct (NMC, 2008). Protecting confidentiality in qualitative studies is recognised as being problematic due to the nature of the small sample size as opposed to quantitative research where there is a degree of anonymity in numbers (Manning, 2004). Participants were assured that all data relating to them would be held securely and that only the researcher would have access to personal identifiable information which would be stored separately from

the data generated by the study. All transcripts would be anonymised through the allocation of pseudonyms. Participants were informed that in the writing up of the study, verbatim quotes from the interviews might be used, though all measures would be taken to remove any information that could identify individuals, and consent was gained for this prior to the interview.

As a practising midwife I am obliged to conform to my code of professional conduct in order to protect individuals from harm and to promote wellbeing. It was recognised that my professional status might have the potential to raise a conflict of interest between the roles of researcher and midwife. The Code (NMC, 2008) was the framework for my actions and therefore I was cognisant that the needs of the individual outweighed the needs of the study. If participants asked for my professional advice it was given freely and women were signposted to their midwife or GP for further information and support. Prior to recruitment it was decided that should the safeguarding of children be recognised as an issue, referral to the healthcare team would be necessary in the interests of child protection. This aspect was discussed during the LREC meeting at length and is why it was deemed necessary to make it clear to participants the nature of my profession.

3.1.4 Ethical approval

Because the study involved the recruitment of participants within an NHS setting, ethical approval prior to commencement was required from the Local Research Ethics Committee (LREC) as well as approval from the relevant Local Health Board Research and Development Department (R&D). An electronic application was submitted using the Integrated Research Application System (IRAS) which combines the application process for both LREC and R&D review. I was invited to attend the LREC meeting where the study was being considered to answer queries regarding the application and research proposal. Following minor changes to the participation information sheet and consent form, the application received a favourable ethical opinion and R&D also approved the study (LREC reference 11/WA/0018 see Appendix 12).

3.1.5 Gaining access

Following ethical and R&D review, consent for antenatal clinic midwives involvement in the recruiting of women was obtained from the Head of Midwifery for the LHB, and a meeting was set up with the two Antenatal Clinic Managers. This meeting provided an opportunity to give a full explanation in person about the study and ask for midwifery assistance during recruitment. Both Managers were enthusiastic and willingly gave their assistance to the study and co-opted other clinic midwives into the recruitment process. All recruiting midwives were given a comprehensive list of inclusion/exclusion criteria and were provided with written information about the study. Potential participants were identified by the clinic midwives during the routine first antenatal appointment following booking where women are routinely weighed by clinicians. Contact details of interested participants were kept within the clinic office in a sealed envelope. Only antenatal clinic staff had access to this office which was used for storing patient documents including highly confidential records such as blood test results and was thus deemed to be a secure environment for the storage of participant contact details. This was collected on a weekly basis, and two weeks after being approached, women were telephoned by the researcher to establish whether they were still keen to participate and if so a date and time was arranged. This weekly contact with antenatal midwives permitted discussion with them regarding recruitment and ways to improve it, as well as serving as a gentle reminder to continue to recruit participants to the study.

3.1.6 Method of analysis

As with the scoping study, audio recordings were transcribed and imported into NVivo and then, following the completion of data collection from both time points, analysed using the same three stage framework described by King and Horrocks (2010) and as outlined in CHAPTER 2 (page 76). This produced two different layers of coding, firstly factual coding of data which provided an overview of sample characteristics, and secondly thematic coding which gave a deeper insight into the views and experiences of participants by the grouping of similar themes.

Interpreting qualitative data can, by its nature be seen as subjective and so there are various methods to improve the rigor and to reduce this subjectivity of analysis.

Respondent feedback is one method to assess the quality of analysis (Gibbs, 2007) however, this method was rejected for three reasons. Firstly it was noted that this may result in a particularly high participant burden. Secondly, given the sensitive nature of the topic, in some cases the views may be considered socially undesirable and therefore lead to a possible rejection or reinterpretation of accurate themes. Lastly as this was a longitudinal study, respondent feedback may also have led individuals to put greater weighting onto my interpretation of their views and thus impact upon their lifestyle behaviours during pregnancy which in turn may affect the responses to questions during the follow-up postnatal interviews. It was therefore decided that independent cross checking of themes was the method of choice to ensure the quality of thematic analysis. The cross checking involved four transcripts that were circulated to the supervision team, these transcripts were then individually coded by team members prior to a meeting to compare and critically discuss the coding of data as has been described by other researchers (Barbour, 2001). The meeting resulted in a clear and definite consensus amongst the team regarding the themes identified.

3. 2. Results

As with Study One, this section is divided into two areas. Firstly the results of the factual coding will be detailed which provide an overview of the sample characteristics. This will then be followed by the results of the thematic analysis exploring the participant's views, expectations and experiences of weight gain and lifestyle behaviours during pregnancy. All participants were assigned a pseudonym and therefore any quotes used will be identified by this. For clarity, quotes assigned to the code T1 will identify that the extract is taken from the antenatal interview and T2 refers to those taken from the postnatal interview. NVP refers to nausea and vomiting in pregnancy. Mode of birth is provided for T2 quotes, and has three possible modes; Normal Vaginal Birth (NVB), Caesarean Section (LSCS) or Forceps extraction (Forceps).

3.2.1 Factual coding

3.2.1.1 Participant characteristics

A total of 15 participants were recruited to the study and none were lost to follow-up. The characteristics of the participants can be seen in Table 8. The ages of women ranged from 20 to 37 with a mean age of 27 years. Participants were white and of British origin and all except one of the women were employed. The BMI classification was evenly split between overweight (BMI 25-29.9) and obese class 1 (BMI 30-34.9) with the exception of one who was classified as obese class 2 with a BMI of 35.7 at the point of interview.

Table 8 Participant characteristics (N=15)

| | | <i>n</i> (%*) |
|--|-------------------|---------------|
| Age | 20-24 | 4 (26.6) |
| | 25-29 | 7 (46.6) |
| | 30-34 | 2 (13.3) |
| | 35+ | 2 (13.3) |
| Employment | Unemployed | 1 (6.6) |
| | Professional | 7 (46.6) |
| | Clerical | 6 (39.9) |
| | Unskilled | 1 (6.6) |
| BMI @ 1 st interview | 25-29.9 | 7 (46.6) |
| | 30-34.9 | 7 (46.6) |
| | 35+ | 1 (6.6) |
| Mode of birth | Vaginal | 8 (53.3) |
| | Caesarean section | 5 (33.3) |
| | Forceps | 2 (13.3) |
| Interval from birth to follow-up interview | 6-8 weeks | 9 (59.9) |
| | 9-10 weeks | 5 (33.3) |
| | 11 weeks | 1 (6.6) |
| Weight loss/gain @ follow up | Loss of >5kg | 1 (6.6) |
| | Loss of 1-5kg | 3 (19.9) |
| | Loss of <1kg | 2 (13.3) |
| | Gain of <1kg | 2 (13.3) |
| | Gain of 1-5kg | 5 (33.3) |
| | Gain of >5kg | 2 (13.3) |

* Percentages should be treated with caution due to small sample size.

The mode of birth was in a similar proportion to the picture for the maternity unit where all women gave birth as a whole ; that is, in 2010 28% of births were via caesarean section, and 12% had an instrumental delivery (BirthChoice UK., 2010). All women delivered their babies at term (37-40 weeks gestation) bar one who had an emergency caesarean section at 32 weeks for placental abruption¹². The interval from birth to follow-up interview had a range of 7-11 weeks, with a mean interval of 7 weeks. One participant was followed up 11 weeks after the birth of her baby and this was due to difficulties in making contact with her as she had moved house in the intervening time between the birth of her baby and 6 weeks postnatal.

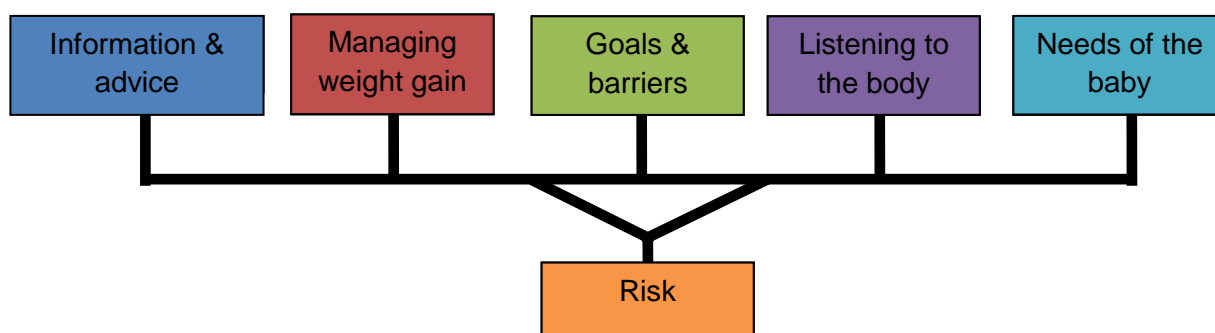
Weight changes from 1st interview to follow-up interview were varied as can be seen by Table 8 (page 114). Five participants had a weight loss of between 800g and 3100g. One participant who was followed up 6 weeks after the birth of her baby had a total weight loss of 6 kilos. The majority of participants however, had small weight gains of between 400g-5000g. Two participants had gains in excess of 5 Kilos, (6400g & 9000g). Both of these women had Caesarean sections so may not have been able to resume normal activity by the time of interview which may explain in part why their weight gain was higher than the other participants. However, it should also be noted that the participant with the greatest loss in weight (6 kilos) also had a caesarean section. The sample size being small means that any interpretation of quantitative results should be treated with caution, although the variation in weight changes between the two time points amongst the sample is interesting.

3. 2. 2 Thematic coding

Thematic coding of the transcripts of interviews identified five overarching themes as follows: Information and advice, Managing weight gain, Goals and barriers, Listening to the body, and Needs of the baby. A prominent sixth theme, Risk was also identified, and this recurred throughout all the other themes and as such could be classed as a subordinate theme (see Figure 4)

¹² Placental abruption – an acute complication of pregnancy where the placenta partially separates from the uterus, it is an obstetric emergency which can be fatal to both mother and fetus.

Figure 4 Study Two Themes



3. 2. 2. 1 Theme 1: Information and advice.

Information and advice came from a number of different sources; be that the routine care and advice provided by health professionals, advice given by family and friends or through self-directed research using printed and electronic resources. The women recognised that some of the sources were less reliable than others and some reported feeling overwhelmed with the amount of written information provided.

'That's a heck of a lot of information'

Women were asked what printed information they had received regarding their lifestyle in pregnancy and from whom had this come. All women reported being given bilingual version of The Pregnancy Book (DOH, 2009d). However one participant admitted that she had not looked at it.

"I know we had the book from the visit, the thick one. But I can't say I have looked through that. I don't know if there is anything in there, is there?" (Nicola T1, 29 years, BMI=27, NVP)

The fact that Nicola refers to the book as the 'thick one' could be seen as giving an indication as to why she had not attempted to look at it, it could be viewed as an intimidating amount of information. This version of the Pregnancy Book is indeed large and is the size of a telephone directory with 304 pages (half of which is printed in Welsh the other half English). Despite its size, Nicola was the only participant to openly state that she had not looked at it, though others admitted to feeling overwhelmed with the amount of printed literature. Gemma felt that there was a general oversupply by the midwife of printed information given to pregnant women.

*"I was quite shocked when I went and you get you know, the bounty pack¹³, and I thought, God. That's a heck of a lot of information to me. And it was all over the table I was like [pulls a face]. Um I think they do give out quite a lot of information."
(Gemma T1, 31 years, BMI=27)*

'This is what we advise'

General Practitioners (GP's) and midwives were mentioned by the women as sources of advice about healthy lifestyle during pregnancy. Although for some of the women, the advice that they received from their GP's was felt to be limited or inaccurate.

"I'd seen the doctor and he told me. And I'd read things that I shouldn't [eat] 'cause I wanted to obviously know. So um Yeah. It would be the doctor mostly. Although he did tell me I wasn't supposed to have yoghurt. But everything else seems to say that you should have yoghurt." (Emma T1, 22 years, BMI=27)

*"I thought, right. I had better go to the doctors because I'm going to South Africa on Monday, so I went to the doctors and saw a bloke doctor and I said, oh you know, I'm pregnant, what food should I avoid? I'm going to South Africa? And he said. I don't know look it up on the internet! [laughter] I was like, Oh great!"
(Hannah T1, 36 years, BMI=28, NVP)*

Many of the women found their named community midwife to be helpful and a source of information and advice and someone they could turn to if they had any questions.

"I think it's brilliant the way that you have sort of. I saw the midwife at 10 weeks had the scan at 12, saw the midwife at 16, and now I've got a scan, next month and I see her the month after. You constantly have something going on every month, to do with the baby. Which is support. And [my midwife] is so approachable, that I could just ring her any time during the day, and I know she would be there and give advice." (Olivia T1, 22 years, BMI=28, NVP)

'You don't see a midwife much in the first stage'

It is clear from the above quote that Olivia was very happy with her encounters with her midwife. Although for some it was evident that the contact they had with their named midwife was limited, and the schedule of antenatal appointments, particularly in the

¹³ Bounty Pack: - A commercial pack given out to all pregnant women and new mothers in the UK which includes promotional information, free samples of products and discount vouchers.

early weeks left some of the women feeling very isolated from what they viewed as a potential source of information and support.

“You don’t see a midwife much in the first stage of your pregnancy. You get your booking and you get a 16 week appointment, and then you get 2 scans, but there you are halfway through your pregnancy then before the regular contact comes in. I think you can feel, “oh is there something I should be doing? Or am I missing out on something? Cause you go a long stretch without seeing an official person as well. Which can leave you feeling quite isolated and on your own.” (Mary T1, 25 years, BMI=32, NVP)

For one participant the booking appointment at 10 weeks gestation was too late to be providing information in safety aspects of food:

“Because you’re telling me at 10 weeks, don’t eat pate or whatever, now if I hadn’t of found out for myself I would never have known. And I’m like almost at the end of my first trimester by then. Do you know what I mean? Nothing against them personally, but why are you telling me that now, I needed to know that 6 weeks ago when I first found out I was pregnant.” (Jane T1, 31 years, BMI=25)

When asked about what advice women had received regarding their diet and activity levels, not all women reported having a discussion with their midwife. Some reported that advice was given in the form of the literature provided by their midwife and not through a face to face discussion. One of the participants made the point that the information that she had been given was centred around what not to do and not around the things she could do to improve her health;

“There is a lot of focus on “don’t eat this and don’t eat that, and don’t drink this. There is nothing really out there that gives you a bit of guidance that says; “if you want to do this you can and if you want to make some changes, this is what we advise.” (Mary T1, 25 years, BMI=32, NVP)

This view is interesting because it would suggest that Mary recognised that the information she had been given tended to focus on the negative and was about risk avoidance and in fact she would have welcomed information that was more proactive and encouraging that could help her make positive changes.

'The doctor used to send us home with stout'

Interestingly when it came to seeking advice or support from others, siblings or friends who had recently had babies were mentioned, but the participants' mothers were not relied on as source of up to date information. Indeed they recognised that their mothers (or in some cases, mother in-laws) were not advised on safety aspects of food and drink when they were pregnant and often would consume foods that are now considered inappropriate for pregnancy.

"And then obviously the advice changes as well so, my mum is like, why are you not eating runny egg yolks? They are fine. You know she's got three children, I'm the oldest. And she was like, God the doctor used to send us home with stout when I got pregnant with you, and that kind of thing."(Jane T1, 31 years, BMI=25).

"My mum said that: "I was drinking half a Guinness a day for the iron and you're all fine" and I'm like yeah ok – that's debatable [laughter]. My mother in law was like; "Oh I drank and smoke on both of mine". But they did back then. There wasn't any advice to stop smoking or stop drinking really." (Mary T1, 25 years, BMI=32, NVP)

The women were therefore aware of the changing nature of the advice being given to women and that foodstuff which were once encouraged during pregnancy were now recognised as being inappropriate and to be avoided.

'What I've gone out to find myself'

In the absence of advice from care givers some participants would search for answers from other external sources.

"It's just been in leaflets that I've been given and perhaps books that I've been given. But nobody has actually said actually sat me down and said "Ok are you aware of your diet. But I mean. I'm quite um, you know I'm quite organised and I like to plan stuff So I know that. Ok I need to be making sure that I am having my five a day. I'm having my carbohydrates, my proteins, my calcium." (Claire T1, 26 years, BMI=32)

"I wouldn't say I've had any advice. I've asked questions like is it ok to eat this or is it not Ok. But I wouldn't say that I've been told "did you know that this is good, this isn't good" Um. Other than what I've gone out to find myself. Um. I haven't been told anything. Which I don't think I don't see that as a negative thing. It's just. I would have gone out to find that out myself. But I

suppose it would have been nice to be told um Even the obvious things like fruit and vegetables and stuff like that. It would have been nice to have had some advice.” (Debbie T1, 28 years, BMI=30)

Both Claire and Debbie’s responses are interesting as although they would have appreciated a discussion or guidance from their midwife they both clearly felt that it was also partly their responsibility to investigate what they should be doing, and thus demonstrating their clear sense of autonomy.

One participant noted that trying to find out information yourself can be problematic as it was not always evident that the advice was current or even reputable, and so she would have welcomed midwifery advice which would be a source she would have trusted:

“I think they could talk about exercise more, what you can do and what you should do. Cause it is said that you can exercise but they don’t go into much about it. There’s a little in the books and a little on the internet. But it is kind of finding out for yourself really as well. What you can do and what you should do. And because it’s conflicting on the internet, nothing is set in stone. But if there was something that the midwife or the doctor gave you then it’s.. you know.” (Kate T1, 28 years, BMI=36)

Other sources of information mentioned by the women were from books and magazine that they had bought or had been given to them as gifts from family or friends. Many also mentioned the internet as a resource, accessing different sites and using search engines such as Google to find out specific information. Websites that were frequently used and mentioned by name were; NHS Choices, BabyCentre and Mumsnet.

“People don’t know, especially if it’s your first, you don’t really know what you should be doing. You get a lot of your information, handed down, or off the internet or stuff like that.” (Mary T1, 25 years, BMI=32, NVP)

“We’ve Googled just random titles, like exercise in pregnancy or food in pregnancy. But we have always gone back to BabyCentre. Because a lot of the stuff that pops up are forums, and just general peoples opinion, it’s not.... You shouldn’t be following that, just general people.” (Kate T1, 28 years, BMI=36)

‘Can you tell me which one’s right?’

Participants were cautious about information that they had found themselves on the internet and would often double check with other resources before acting upon it. In

particular many of the women recognised the limitations of some of the websites, particularly when they were forums, commercial sites or websites that were based in other countries.

"I'm very much, if I want to know something I'll find it out. I will look it up on the internet. Which I know is a very dangerous thing. But I'll get A, B, C, D, E. and then I'll go and I'll say can you tell me which one's right? Can you tell me? Like and I'll learn myself." (Annie T1, 37 years, BMI=32, NVP)

"I do check on like, another website or I, you know, if I Google something I won't just check one thing I'll check a few after to just check if they say the same thing So I haven't yet come across anything. Touch wood, come across anything that I thought was dubious." (Claire T1, 26 years, BMI=32)

One participant mentioned that her partner had downloaded software for a mobile device that gave information about her pregnancy via weekly phone updates and informed her what she should be doing to stay healthy, including food.

"And he [referring to partner] has got an iphone, and he has got an application which he has downloaded, which is week by week in pregnancy. So we can see what is going on with the baby week by week. But then it also tells you what is going on with your body and it says a little bit on foods, and diet. So we have been flicking though that really haven't we?" (Olivia T1, 22 years, BMI=28, NVP)

It would seem that software developers have produced a pregnancy application for mobile devices which has been embraced by some users. This demonstrates the new and innovative ways in which individuals will seek and access information, although, as with the internet sources, it is apparent that Olivia and her partner treat information gained via this application with a degree of caution.

'At a guess, I'd say about 2 stone'

Women were unable to recall having received any information about weight gain in pregnancy from their midwife, and although there is a small paragraph about it within the Pregnancy Book, it was evident that the women had not seen it. Only one participant recalled having read it and she recalled the statement advising against dieting.

“Well obviously it does say in the book, you know. Don’t try and diet while you’re pregnant, because you are supposed to put on weight. You know.” (Imogen T1, 29 years, BMI=26)

Many of the participants were unsure as to how much weight they would expect to gain through the course of their pregnancy. In the absence of information some had actively sought to find out using the internet, whilst others appeared to be less concerned.

“I looked on the internet and it did say like a stone. A stone. And I was thinking.[sigh] and that’s what frightened me. And I was like: I can’t put that much on!” (Bethan T1, 20 years, BMI=34)

“I haven’t got a clue [how much weight I’d gain] at a guess, I’d say about 2 stone. Is it roughly for pregnancy? I haven’t got a clue!” (Paula T1, 20 years, BMI=30)

“I’ve been having a look. Just on average because a lot of the like Baby-net and Baby-centre and all them websites. They all say guidelines of. A range of what you would put on. Um Anything from like 10 pounds up to like 40 pounds I’ve seen on one website.” (Claire T1, 26 years, BMI=32)

The women obtained information and advice from a number of different sources, including health professionals, family friends as well as written sources such as leaflets and books and electronic sources such as the internet. The women viewed the midwife as the most reliable source of information and advice and would have welcomed more opportunities, especially earlier on in pregnancy to discuss diet, exercise and weight gain with their named community midwife. In the absence of information from health professionals women would seek out other sources, most commonly the internet. This self-directed research to obtain information was recognised as having limitations and the internet and advice from family and friends was viewed with a degree of scepticism until it could be supported by more than one source.

3. 2. 2. 2 Theme 2: Managing weight gain

There was a degree of ambivalence around weight gain during pregnancy, and whether it could or should be managed. Some women felt very anxious about gaining what they considered to be too much, whilst others felt pregnancy afforded them some freedom from the pressure they usually felt to lose weight.

'Just be natural and healthy'

Many of the participants saw weight gain as an inevitable part of pregnancy that so long as it was an appropriate amount that this was normal and healthy and therefore not something to be concerned about.

"I think I've got quite a laid back attitude. Try and eat healthily be sensible and just drink a shed load of water. And hopefully what weight I do put on will just be natural and healthy." (Hannah T1, 36 years, BMI=28, NVP)

"I haven't read up or anything. To be honest, so long as it's not - you know a huge amount because it's expected that I am going to gain weight um. Whether that would be baby, food, or fluid." (Debbie T1, 28 years, BMI=30)

However this 'laid back attitude' to weight gain was not universal. Although they were interviewed during the early second trimester when their pregnant state was not obvious to the outside world, several women found their changing body shape and increasing weight a cause for concern.

"I have absolutely no idea what to expect. I have thought about it though because. Um. I put a lot of weight on my stomach as soon as I got pregnant, and I know I'm not a small girl and I haven't been. But I noticed that I was putting a lot of weight on... but obviously I was concerned and still am worried about um. Pressure on my body you know, that I'm causing that I don't necessarily need to cause." (Fran T1, 25 years, BMI=31)

"Well I'm really worried to be honest with you. That I am going to end up putting on loads of weight and then not being able to shift it. Um I keep looking in the mirror all the time and saying am I putting on loads of weight?" (Olivia T1, 22 years, BMI=28, NVP)

'That is a bit risky'

A number of the women stated that gaining too much weight during pregnancy would put their or their baby's health at risk or cause long-term issues with weight and that therefore excessive weight gain was something that should be avoided.

"I couldn't tell you how much, I'd expect to go for something like about two stone two and a half stone something like that. I think that's about sensible. Any more than that is a bit risky for the baby and for myself." (Debbie T1, 28 years, BMI=30)

Some felt that excessive weight gains would increase the chances of them developing longer term issues with their weight which left them with increasing anxiety about their changing body shape.

"I was wary of getting pregnant. My mum, there's four of us in our family. And I think with each child she gained weight and she never really lost it all. So she just gained more on top of that. And I always thought, with the greatest respect. I would like to lose the weight after each pregnancy and not just keep it on and stuff." (Mary T1, 25 years, BMI=32, NVP)

Putting on weight as a result of pregnancy was something that Mary had thought of prior to her pregnancy and her mother's experience of gestational weight gain had obviously influenced this. Mary says that the idea of putting on weight made her 'wary of getting pregnant' and so it's clear that Mary was fearful that she may have the same experience as her mother. Other participants felt large amounts of weight gain may not just have consequences for body shape but may have a more direct detrimental impact on their health and wellbeing.

"There is nothing that I can find in much of the books about the effects of weight gain on the baby on you. So I know that it's not healthy to be overweight. And I know that it can put pressure on my heart and it can make the baby overweight. So other than that, if there is any other sort of effect that you can get. DVT or I don't know!" (Fran T1, 25 years, BMI=31)

'I'll deal with it afterwards'

Despite the view that high weight gains could have health implications, several voiced the opinion that pregnancy was not the time to be worrying about it as any weight gain could be tackled after the birth of their baby, when only they would be affected by dietary or exercise behaviours, without having a detrimental effect on the baby.

"Um it was in the back of my mind that I didn't want to put on loads of weight. But I was also a bit like, well, whatever weight I did put on, I will deal with afterwards. So whatever comes, I will just sort that out further down the line." (Jane T2, 31 years, BMI=25 Forceps)

"I'm quite short so I do put on weight quickly anyway. So I was prepared that I would gain the weight. But I'm hoping I am not going to put on more than two, two and half stone. But I don't know. So far I have put on about 16 pounds. And I'm coming up to half way through so I know it's probably not the best. But there is nothing that I would say. Oh I've got to diet or anything like

that. I know it's just naturally going to happen and I will worry about losing it after the baby is born." (Mary T1, 25 years, BMI=32, NVP)

This rationale was most noticeably present in those women who had a history of dieting behaviour where in the past they had been successful at losing weight. And it could be argued that this demonstrates that they had some degree of confidence in their ability to modify their weight through behavioural changes, when they actively pursued this.

"I'm not really worried about it post pregnancy because I know with my body I can burn fat off quite fast. Um and I can turn it into muscle quite fast. I get quite, quite like muscley legs and if I'm working out and stuff. So I'm not worried about it after my pregnancy." (Fran T1, 25 years, BMI=31)

"And I know it myself. I am going to put on weight. I know it's going to happen. And that's just the way I am. Plus if I'm having my Burger Kings then it's going to stay on [giggles]. But I think I have got in my head; because I lost the weight for the wedding, I know afterwards, that I can lose the weight. So I haven't particularly been worried about the whole weight thing, I suppose." (Nicola T1, 29 years, BMI=27, NVP)

'Oh well I'm going to get fat anyway so I'm just going to eat some cake'

For some women it was apparent that pregnancy was seen as an opportunity to not to have to worry about weight gain, as it was an inevitable part of pregnancy and this therefore gave them a degree of confidence and freedom to eat what they want.

"Two of my close friends have just had babies, in July. And our other close friend, her little boy is one today... I don't think any of them were particularly unhealthy. Um I do think that we all had the 'whatever' approach. Oh well I'm going to get fat anyway so I'm just going to eat some cake." (Jane T1, 31 years, BMI=25)

"I have always been worried about my weight. I have always been trying to stick to a diet. But in pregnancy. Not really." (Paula T1, 20 years, BMI=30)

For some women the tussle between not wishing to gain lots of weight, but still wanting to enjoying the freedom that pregnancy provided to relax their previously controlled eating habits was all too evident.

"Well I'm really worried to be honest with you, that I am going to end up putting on loads of weight and then not being able to shift it....And I've always had huge thighs [giggles] And yeah.

Although I am worrying about it subconsciously, I am still eating what I want!" [laughs](Olivia T1, 22 years, BMI=28, NVP)

Interestingly at both interviews, Olivia's response to the question whether she had thought about weight gain during pregnancy showed the ambivalence she felt about it. She was very concerned about putting too much weight on and clearly had anxieties around her body image yet this did not appear to impact on her eating behaviour and she continued to eat energy dense foods whenever she wanted.

"Yeah, it was worrying. But I didn't really let myself worry, if I fancied a KitKat, I'd have a KitKat I wasn't rigid or whatever. And afterwards looking back on the pictures my face was like this [signals swollen face] and my arms were huge. And I was weighed yesterday and I know how much weight I have put on."
(Olivia T2, 22 years, BMI=28, NVB)

There was a degree of ambivalence regarding gestational weight gain. Gaining an appropriate amount weight during pregnancy was seen as inevitable by the participants, however for some this change in weight was not viewed as a positive and natural process as they found their increasing weight difficult to accept. This may be due to the fact that prior to pregnancy several of the participants are likely to have viewed weight gain as a negative thing and therefore something to be avoided, so to view appropriate weight gain in a positive light would take some adjustment. Excessive weight gain was a concern to many of the women, who were fearful that too much weight would have implications for their health and wellbeing. Others were concerned that they may have difficulty in losing any weight gained after the birth of their baby and this would have long-term implications for their weight management. However, for those with a history of successful dieting, pregnancy appeared to provide them with the freedom to eat what they wanted to without restraint or anxiety as any weight gained as a result of pregnancy could be tackled after the birth of their baby.

3. 2. 2. 3 Theme 3: Goals and barriers

Participants appeared highly motivated and had very clear intentions to make positive changes to their diet and to a lesser degree their activity levels. They identified goals that they hoped to attain as well as barriers that prevented them achieving their goals. The two behaviours; diet and exercise/activity will be looked at in turn.

DIET

The participants reported that they had intended to improve the overall quality of their diet, most commonly through increasing their fruit and vegetable intake but they reported encountering barriers which prevented them from achieving this.

'A lot more sensible'

Many felt it important to ensure that their growing baby was being adequately provided with nutrition through their food intake. The majority of women had goals to improve the quality of their diet, mainly this was in relation to their fruit and vegetable consumption.

"My eating has become a lot more sensible. Not eating less. But instead of thinking Oh I need a chocolate bar. I think oh no I can't – not that I can't but I think it's better, not for myself but for the baby. Now it'll be an apple or a banana and so consciously I'm deciding to make judgments on eating better. You know eating more healthier foods" (Debbie T1, 28 years, BMI=30)

"I have made some changes, I'm eating more fruit and vegetables. I am making sure that I have breakfast in the morning, stuff like that." (Mary T1, 25 years, BMI=32, NVP)

The government target of consuming five portions of fruit and/or vegetables a day was mentioned by several women. Some women reported that this target was easily achievable however this was not a universal view and others clearly struggled to reach this.

"I wouldn't say that I got 5 a day. I would say that I am better and I'm getting an average of about 3 a day. So you are probably looking at about 1 a day before that. It sounds awful doesn't it? And I've found that I have gone off vegetables. But now I seem to have, not fancying vegetables which I know is bad." (Nicola T1, 29 years, BMI=27, NVP)

When asked about foods to avoid during pregnancy all women mentioned safety aspects of food such as avoiding soft cheeses, undercooked meat and runny eggs to prevent the risk of infection¹⁴ and harm to them and their baby and were confident in their ability to avoid these. What was interesting is that only one woman mentioned avoiding foods that were high in fat.

¹⁴ Foods to avoid in pregnancy include those associated with foodborne infection such as listeria, salmonella and toxoplasmosis as well as those high in vitamin A and mercury, high levels of which are known to impact upon fetal development

"I know I really should be avoiding the higher fat, saturated fats, and stuff like that." (Mary T1, 25 years, BMI=32, NVP)

Messages about safe eating practices during pregnancy have been widely disseminated and appear to have been embraced by participants; however the messages about avoiding foods that are high in fat and sugar did not seem to have been adopted to the same extent. The reason for this is not clear. It may be that those foods which are known to contain pathogens are more readily accepted by women as being detrimental to the development of their growing baby; consuming even one undercooked egg could lead to salmonella whereas it is sustained eating of foods high in fat and sugar that is linked to weight gain and the problems associated with it. Therefore food to avoid may be viewed in terms of the severity of acute threat that they pose to the unborn baby.

'I can hardly face it any more'

Various barriers were identified by the women which they felt prevented them from eating what they considered to be a healthy diet. One of the most often cited barrier to healthy eating was nausea and vomiting in pregnancy (NVP). For some, the extent of their NVP was debilitating and left them equating their pregnancy to illness.

"To me, I wasn't pregnant, I was ill. That was how I was feeling. Constantly being sick all the time, so it was just like a strange feeling." (Nicola T1, 29 years, BMI=27, NVP)

Many found NVP during the first 12 weeks meant that their diets had substantially changed; foods that they once relished made them nauseous and when they had identified foods that they were able to keep down they would stick to them, often leading to a very restricted diet. Vegetables and meats were frequently mentioned as triggers for NVP. Conversely some identified that biscuits and crisps were foodstuffs that could be consumed that could avert a bout of NVP. This meant that for some, their intention to eat a healthy diet was thwarted by the NVP.

"I am spinach mad, broccoli mad cabbage mad, um all of those things. Courgettes. But I can't hardly face green veg these days so I am eating loads less." (Hannah T1, 36 years, BMI=28, NVP)

"I was having to put Rich Tea [biscuits] by the bed, because I just felt so sick in the morning. I couldn't go anywhere without just a pack of mints, or a biscuit on me or anything. Cause I just felt so sick." (Olivia T1, 22 years, BMI=28, NVP)

“But as naughty as it sounds, I couldn’t just eat fruit either, without something else. Like if I ate like a tangerine or a banana I would feel even worse, whereas I needed a biscuit with it to just sort of line my stomach.” (Olivia T1, 22 years, BMI=28, NVP)

Some were concerned that the NVP which prevented them from eating adequately would have a detrimental effect on their growing baby, and felt that any food consumed was better than none. It would appear that their expectations of their ability to have and maintain a healthy diet changed and instead the focus was on having ‘any food’ rather than the ‘right sort of food’.

“I knew myself as long as I was getting some calories, it didn’t matter. Obviously it’s better if you can have your fresh fruit and your vegetables. And because I had been so focused on eating good stuff, which I couldn’t get down. I wasn’t focused on getting anything else down. It became; If I fancy it and I can eat it I’m going to eat as much as I can of it.” (Annie T2, 37 years, BMI=32, LSCS)

“And you’re also a bit worried. You know you should be eating all this food. And your just picking at little bits ...I was just living off starch and carbohydrates. The odd piece of fruit. And I’m thinking it can’t be too healthy!” (Mary T1, 25 years, BMI=32, NVP)

‘It’s not cheap to eat healthy sometimes’

Other barriers that prevented participants achieving their goal of a healthy diet were a lack of time as well as having financial constraints. For some women, working fulltime meant that when they came home from work they often wanted to eat something that was quick and convenient and did not require too much preparation.

“Either finish and I have time to make something nice for dinner, or by the time I get home its normally about quarter to nine, by which point it’s, it’s difficult to make a big hoo ha.” (Fran T1, 25 years, BMI=31)

For others, it was the timing of meals rather than the content, with a couple mentioning that they ate late in the evening due to their work or their partners work, which they felt was not ideal.

“I would have to wait for Neil to get back from work. So you are talking between 7 and half 8 eating, which isn’t the best. But if he were off, we would try and eat at a sensible time. Which for me which is half 5 six. That’s tea time to me. And um. That is what we would try and do when we were off together. You know. Try and get a normal time. Because I can’t go to bed with a full

stomach. So you're eating later and then you're going to bed later then." (Nicola T1, 29 years, BMI=27, NVP)

The cost of eating a healthy diet was mentioned by a few as a barrier.

"I think, that if you're not that well off I think you're going to have problems, like I have to eat all this fruit and veg and it's going to cost me £20 extra a week or something. So I think there could be budget restraints on that with healthy living." (Mary T1, 25 years, BMI=32, NVP)

"I know sometimes it can be a bit expensive to get like fresh like fresh fish and stuff like that. But you know. If you budget properly. And you, you know only have it like once a week or twice a week or whatever then that's not much of a problem. But I suppose you know it would help if you could have some more finances to help towards that. Because I mean it's not cheap to eat healthy sometimes." (Claire T1, 26 years, BMI=32)

It was evident from the interviews that women identified constraints in either their time or their finances acted as a barrier to them achieving a healthy diet.

'Bonkers for sweet stuff'

During both the postnatal and antenatal interviews the majority of the women would indicate that there were internal drivers or impulses that caused them to consume or avoid certain foods. In particular they would talk about 'cravings' or 'fancies' that they had because they were pregnant.

"I'd say. 'Oh I fancy this' and he'd be like [makes a whizzing noise] and he'll go and get it. Mint Cornetto's as well were a good thing. " (Annie T1, 37 years, BMI=32, NVP)

"I do I try and eat as healthy as I can. But now it's just wanting things. Like a custard cream slice. And my mother's like 'I don't think you can have that' and I'm like 'I have to!' " (Bethan T1, 20 years, BMI=34)

For some, the latter stage of pregnancy was when they were most susceptible to the drive to consume unhealthy foodstuffs which often the women referred to as 'cravings'. The typical cravings disclosed tended to be for energy dense foods stuff and snacks which were either high in sugar or fat and therefore not considered to be healthy

"I was very, very healthy, but as I got further through the pregnancy, I craved more and more chocolate. And about two thirds of the way through. I had a really big craving for

McDonalds, and ice-cream! [laughs]" (Fran T2, 25 years, BMI=31, LSCS)

"Towards the end, the last two months, if it didn't look like chocolate, taste like chocolate or was covered in chocolate.... [laughs] I did go bonkers for sweet stuff. I could have lived on sugar. Um." (Gemma T2, 31 years, BMI=27, LSCS)

"I tried to eat healthily as often as I can, I still do now, I always do but towards the end, you do have cravings for nice things, like chocolate and cakes and [laughs]" (Imogen T2, 29 years, BMI=26, NVB)

Aversions to food stuffs were also disclosed by some women during the first interview, and these aversions appeared to affect the quality of their diet: where things that had once been palatable, were no longer desired and often participants would describe the foods in terms of repulsion.

"I've been off tea and coffee since day one....It just turned on me. Tea and coffee just turned on me completely So I've got 14 weeks without tea and Coffee" (Claire T1, 26 years, BMI=32).

"Cause I went off meat quite a bit. I don't think I could still eat a steak, but I could eat chicken. But I really went off meat for a few weeks. (Olivia T1, 22 years, BMI=28, NVP)

"The only thing that I'm not eating much of at the moment is veg. It's turning on me a bit. I can eat salad and fruit and all that , just not veg." (Gemma T1, 31 years, BMI=27)

The majority of the aversions appeared to stem from the NVP experienced early in pregnancy but that these aversions often continued for longer than the symptoms of NVP.

"I went off vegetables, anything, I know there is only a certain few I like. But we used to have veg with most things, but now, I just seem to be going more for the carbs. And I don't know whether because I had 8 weeks were I wasn't properly eating and sticking to that food so that is what I have got used to. I don't know." (Nicola T1, 29 years, BMI=27, NVP)

It was interesting that although the women recognised that both the 'cravings' and the 'aversions' were understood to not be considered healthy, it was clear that few appeared to be willing or able to override them.

'Making sure I was eating good stuff as well'

Some participants justified their less than healthy eating patterns, for example Debbie suggested that she was able to offset her less healthy snacking by ensuring she consumed her fruit and vegetables.

"I snacked on puddings mainly. Um. Muffins, cream cakes and stuff like that. Crisps. But then I thought to myself, If I have had the healthy bit, this isn't so bad. If I hadn't eaten my veg and set meals, well I think I would have felt a bit bad." (Debbie T2, 28 years, BMI=30, NVB)

When I probed a little bit more into this area Debbie provided further justification by suggesting that the energy dense food stuffs that she had consumed in late pregnancy was beneficial to her unborn baby;

"Then in the third trimester then, that was relaxed I think I thought to myself that I had done as best as I could, to make her organs etcetera and then she just needed fattening up so in my mind, I thought. I'll have my fruit and treats as well." (Debbie T2, 28 years, BMI=30, NVB)

Claire too was also able to rationalise her decision to consume less healthy food, in particular eating out or takeaways, so long as she ate 'the good stuff' as well.

"Eating out a lot more, thinking well I may as well take you out to lunch now, my parents, because you are not going to have a chance to for the next couple of weeks so. Yeah. The last couple of weeks I probably did go a little bit nuts, but that was just because it was the last couple of weeks. But still making sure I was eating good stuff as well." (Claire T2, 26 years, BMI=32, NVB)

The need to 'eat out' towards the end of pregnancy was mentioned by Gemma too. Both Gemma and Claire saw this as a time to indulge before the baby arrived, when eating out may become more difficult.

"I think we went out more for meals whether it would be with his parents, us on our own, or my parents just because they were like,. Oh quick lets go for a meal while you still can. Before you are chained to the sink for the rest of your life [laughs] (Gemma T2, 31 years, BMI=27, LSCS)

EXERCISE OR PHYSICAL ACTIVITY

Commencing or continuing a non-pregnancy-specific exercise routine during pregnancy was generally viewed negatively and as something to be avoided. Conversely undertaking 'appropriate exercise' such as attending structured classes that were designed for pregnant women or alternatively increasing walking were behaviours that were viewed positively. Participants voiced intentions to engage in 'appropriate exercise' however they encountered several barriers which prevented them from doing so.

'I was going to the gym to try and get my weight down'

When exercise was discussed, several participants prior to pregnancy would do some form of exercise regularly, usually taking part in an exercise class or going to the gym and several had a history of sporadic periods of exercise which tended to be as a means to lose weight.

"I go through phases. Like when I'm trying to lose weight, like 6 months prior to the wedding...I'd say 9 months even. I was doing quite a lot of exercise. I joined the gym. But you know realistically, I'm a bit rubbish to be honest." (Hannah T1, 36 years, BMI=28, NVP)

"I used to [do exercise] but that was mainly to. to get down to a. to slim down for my wedding. I have. I'll be honest. I haven't done any exercise since being pregnant." (Claire T1, 26 years, BMI=32)

"My diet and my weight depends. I go up and down. So before we caught, um. I was going to the to try and get my weight down. And then we caught again so it's going to go back up again.[referring to an early miscarriage before the current pregnancy] (Kate T1, 28 years, BMI=36)

'I have had to give that up obviously!'

The majority of exercisers said that they had significantly reduced the amount of exercise they did as a result of the pregnancy. For some it was that they felt the exercise they were doing prior to pregnancy was no longer considered appropriate and they felt a degree of pressure to stop.

"But I did regular exercise, which is 'Boxercise' every week. So now I have had to give that up obviously! Um I have just

completed race for life on Sunday so that's the second time, that's the second time I done it. So that's something I enjoy. And I used to do my sit ups every day, trying to keep my tummy trim. But I've stopped that! Yeah I've stopped everything now!"
(Imogen T1, 29 years, BMI=26)

However, there was one participant who appeared to be the exception to the rule, who exercised on a daily basis and was determined to continue until she felt that her changing body shape prevented her. Gemma placed a great deal of importance in remaining active through the pregnancy and thought it would be especially beneficial as physical preparation for the birth.

"Because at the end of the day, it's quite a strenuous thing to go through a birth. And you need everything as fit as it can be. Um. Until that point really. That's my plan anyway! [laughs] you know cause I wouldn't want to be you know, knackered just because I haven't done anything. And I think laying about isn't the best thing to do at all." (Gemma T1, 31 years, BMI=27)

However the rest of the participants did not view exercising on a daily basis as a desirable behaviour.

'I doubt I will go back to the gym properly'

Several mentioned that they were intending to explore the exercise classes specifically provided for pregnant women within the area, such as pregnancy yoga and aquanatal. These forms of gentle exercise were deemed as 'appropriate' for pregnancy and therefore they were considered to be desirable.

"I think that swimming is probably going to be the thing that I continue with. I doubt I will go back to the gym properly." (Kate T1, 28 years, BMI=36)

"So now I'm feeling a little bit more energetic, I'm looking at some of the antenatal classes so I'm thinking I might join one of the yoga classes." (Jane T1, 31 years, BMI=25)

Another form of exercise which was seen as being 'appropriate' during pregnancy was walking, and several identified that they would like to use walking as a means to keep active through their pregnancy.

"I will start trying to do something even if its once a week on my day off. Yeah, just a fast paced walk that's all I need. Just to keep myself active, otherwise I will probably go rather large!" [laughs] (Imogen T1, 29 years, BMI=26)

“Yeah, I think you should be doing gentle exercise, I wouldn’t say anything that puts your body under stress, um. But things like walking, just sort of exercise. Just to keep your muscles going. Oh I can preach it!” [Laughter] (Olivia T1, 22 years, BMI=28, NVP)

A number stated that instead of trying to maintain exercise during pregnancy, they had decided to commence a programme of exercise following the birth of their baby as a way to restore their pre-pregnancy shape.

“In a way I have that mentality that says; later on. And my friend now, she did it from May through to now, and she has completely changed her shape by just doing a running regime and she has bought the same treadmill that we had. She has lost so much weight. And I was thinking. Even if I was to follow her, I just have that in my head that I will follow her, and I will be able to lose it and sort myself out.” (Nicola T1, 29 years, BMI=27, NVP)

‘It’s not for the lack of wanting to do it’

Barriers to staying active during pregnancy were identified by many of the participants, the most common of which were the tiredness and reduced energy levels so often experienced by women especially in the first trimester of pregnancy.

“I’ll be honest. I haven’t done any exercise since being pregnant, because I have been too tired. But I do want to because I know how beneficial from reading on websites. How it’s good for you and good for the baby. So I do want to.” (Bethan T1, 20 years, BMI=34)

“To be honest with you I have been really, really tired. And so I have found that I am not doing as much as I used to. No running, no aerobics that kind of thing. I’m starting to feel as if I have got a bit more energy now. Because one of the things is like. Walking to work takes 40 minutes, so, but I was wanting to sleep in bed longer, so that was one of the things. It’s not for the lack of wanting to do it. It’s a case of I’d rather spend that 40 minutes asleep and drive in the car, than walk.”(Jane T1, 31 years, BMI=25)

The tiredness felt during the first trimester by participants obviously impacted upon their ability to keep active and it was evident that in Jane’s case she was trying to conserve her energy, although she could feel her energy levels starting to increase.

'I haven't got time now'

Work was mentioned as a barrier, with some feeling that their job left them with limited 'free time' or energy with which to take up exercise.

"I do try and go for walks and stuff. And I have done say the last three weeks. But getting home from work, I've only got about half an hour light time and then it's just. You don't want to go when you go home. It is on the cards anyway [laughter] whether I will or not. I don't know." (Claire T1, 26 years, BMI=32)

"But then after working, and I was still working full-time, after 5 days in work, in the evening time I thought oh I just really haven't got the energy and then come the weekend. We were trying to do other things, so I was like. I haven't got time now, we were trying to get the room ready and things bought for the baby and then with Christmas shopping as well. So it was just like, I haven't really got time." (Jane T2, 31 years, BMI=25 Forceps)

"As I say I would have liked to have done a bit more exercise but I was doing 10 hours a day so obviously on my days off I was tending to rest a bit more." (Imogen T2, 29 years, BMI=26, NVB)

It was apparent that the limited provision of pregnancy exercise classes proved to be a barrier and this coupled with the financial cost of classes prevented some from participating in the structured classes.

"I did look into aquanatal classes, but the only ones I could see were in [the maternity unit] and I think it's only once a week, and to get all the way down there....." (Mary T2, 25 years, BMI=32, LSCS)

"I did pick up a leaflet the other day which is for yoga. It's really expensive I just. If they want people to go then... It's like £5 for a session or something. Which is more expensive than if you went normally." (Emma T1, 22 years, BMI=27)

At the time of interview only one aquanatal class was provided in the area and the number of places were limited to 15. This class took place on a weekday morning and therefore for the majority of working women it did not fit into their schedule, and those who were not in employment would have found the cost prohibitive.

'I just don't feel comfortable in my body at the minute'

Another barrier cited by the women as a reason for not attending the structured pregnancy exercise classes was that of body image. Although the aquanatal classes were organised as a form of exercise aimed specifically at pregnant women to keep them active and improve their fitness levels, it was evident that for some women, the level of exposure that a swimming costume provided made this form of exercise unacceptable.

"I want to go swimming because the midwife told me about aquanatal and I'm thinking. Oh I'll have to get an all in one suit because I just don't feel comfortable in my body at the minute. So that's just stopping me. But I know that as soon as I've had the baby I'm 'gonna be doing everything." (Bethan T1, 20 years, BMI=34)

"I should probably go swimming, but I'm not very good. I don't like my legs so I don't go swimming. I do enjoy swimming, but I get embarrassed, 'cause I'm quite chubby. So I don't go" [giggles] (Hannah T1, 36 years, BMI=28, NVP)

A frequently cited barrier to carrying out various forms of exercise was that of safety, and this area is explored in further detail under the subordinate theme of Risk on page 146.

'I was full of good intentions'

Although many of the participants (n=9) had expressed an interest in pursuing the organised activity classes provided for pregnant women, at the follow-up interview none of the participants had actually attended either the pregnancy yoga or the aquanatal classes.

"Looking back now, I probably would have liked to have done more. Um. Perhaps started something like swimming, and kept that up." (Claire T2, 26 years, BMI=32, NVB)

No I didn't get around to doing anything to be honest. I was full of good intentions..." (Emma T2, 22 years, BMI=27, Forceps)

"I wanted to be as healthy as possible, but then, you know what's it's like, after working all day sometimes, I'd come home and that sofa looks really good, I think I'll just go sit on there for a few hours." (Mary T2, 25 years, BMI=32, LSCS)

It was clear that during the postnatal interview, although some of the women were initially motivated to be physically active during their pregnancy, this motivation was not enough to overcome the various barriers that they encountered.

'Don't try taking it on now'

Interestingly four of the women voiced the assumption that if women had not been exercising prior to conceiving, then pregnancy was not the time to start as this was considered to be a risky behaviour. This view that pregnancy was not the time to start exercising may have originated with their midwife as this assumption was also noted in the preliminary study when the Antenatal Clinic Managers were interviewed (see page 96). But it may also stem from the historical belief that pregnancy is considered to be a time when women should rest.

"I think as long as you're careful, and you know what your limits are anyway. I mean. If you've always been an active person, then it's probably fine to carry on. But if you have just done a little bit here and there, then you should just carry on doing a little bit and not suddenly think I shall start walking miles every day"
(Mary T1, 25 years, BMI=32, NVP)

"Obviously I was advised. If you weren't doing much before don't try taking it on now." (Fran T1, 25 years, BMI=31)

The participants reported that they had intentions to improve their lifestyle behaviours during pregnancy, specifically to improve the quality of their diet and to commence what they viewed as 'appropriate exercise'. Specific goals relating to changes they planned to make to their diet included increasing their fruit and vegetable intake and avoiding food they considered to be unsafe. The women intended to increase their walking and commence pregnancy specific exercise classes such as aquanatal and pregnancy yoga. However various barriers were identified that prevented them from changing their behaviour and achieving their goals.

3. 2. 2. 4 Theme 4: Listening to my body

Several women, when asked about their dietary and physical activity intentions, would state that these behaviours would be gauged by how they physically felt; that they would 'listen to their body' and respond accordingly.

'If I fancy something I should eat it'

This notion of listening to their body was especially prominent when it came to their eating behaviour.

"Chocolate and coke I seem to have gone more for. And they do say limit your caffeine intake and stuff like that. But for some reason it seems to have gone the other way." (Nicola T1, 29 years, BMI=27, NVP)

"I think that was what was in my head and I thought, well, you know. Like the midwife said to me. If you want that cake you have that cake because you can eat more." (Debbie T2, 28 years, BMI=30, NVB)

"But then I also feel then, that if I fancy something I should eat it. Like if I fancy a bit of toast at 10 o'clock at night then I'll have a bit of toast at 10 'cause I'm hungry you know. Just because I can. I just think. Oh well I'm pregnant, I can!" (Mary T1, 25 years, BMI=32, NVP)

The frequently used term 'fancying' can be seen as evidence of the physical drives that governed their eating behaviour with many seeming to be unable to resist what their body 'fancied'. But the term fancy may also suggest not just a physical impulse but also an emotional response.

'I do put on weight easily'

The participants in this study were overweight and a number of them would state that they had 'struggled' with their weight prior to pregnancy, or that they were unfortunate to put on weight easily, and therefore had to 'watch what they ate'.

"And I don't want to be putting more weight than I have to if you know what I mean. Because I do put on weight easily. Which doesn't help I've always battled with my weight." (Claire T1, 26 years, BMI=32)

"I have always been worried about my weight. I have always been trying to stick to a diet." (Paula T1, 20 years, BMI=30)

It is clear that some of the participants felt that they were unlucky to have a propensity for putting weight on and mindful of their diet as a result. However, being pregnant seemed to give some the permission to cease this type of controlled eating behaviour, and instead listen to their body with the mantra 'eating what I want, when I want' appeared a few times during the interviews.

"I found that I fancied, like a fish finger sandwich and I tended to give in a little bit more, if I wanted something I just tended to have it. If I fancied a chocolate biscuit I'd just have it. So I was definitely a bit more relaxed." (Jane T2, 31 years, BMI=25 Forceps)

"As I said I didn't put any sort of "I can't eat that and I must eat that". I just ate what I fancied, when I fancied, sort of thing." (Mary T2, 25 years, BMI=32, LSCS)

It was apparent that eating what you want or 'fancy' was considered to be socially acceptable during pregnancy and some participants disclosed that not only was it acceptable but it something that was actively encouraged by family members and friends.

"One of my friends did say to me. Not just. Oh. She didn't say oh just eat what you like. But she did say, you know, if you fancy something, just have it. Don't, you know, this is not the time to deny yourself." (Jane T1, 31 years, BMI=25)

One family member who was present during the follow-up interview with Bethan suggested that withholding foodstuff that you 'fancy' whilst pregnant could be detrimental to the infant, perpetuating the idea that dietary restraint was viewed negatively during pregnancy.

Pregnancy would appear to be a time when women would be actively encouraged by those around them to listen to and act upon their dietary urges. Interestingly, for some 'listening to their body' would be at odds with their views on healthy lifestyle in pregnancy, yet it would appear that they these physical drivers were so strong that they felt powerless to override them.

"I always had in my head, that we would eat an awful lot better, and I always thought, when I put on all the weight in my head I was thinking, well if I was ever to get pregnant, I know that because I'd have the baby growing inside of me, that I would want to be eating well. But that hasn't happen as much as I thought it would." (Nicola T1, 29 years, BMI=27, NVP)

The language that Nicola used in the above quote suggests almost a lack of autonomy in her eating behaviour, although she had very clear ideas about the changes she would make to her diet during pregnancy to benefit her growing baby, she found she was unable to carry out this change.

During the postnatal interviews the participants would disclose that during late pregnancy they had been driven to consume foods that they considered to be 'naughty' or 'unhealthy'. Again, they suggested that this was their body communicating certain needs that they should fulfil, despite their view that these were not the healthiest foods to consume.

"At one point I was like, Oh should I be eating this? Not just because of the state of my teeth [laughs], but I thought, would it affect the baby? I think if I'd been doing it right through the pregnancy, I would have been a bit more concerned, about diabetes really, with me affecting the sugar levels going into her body. I did think at one point: Oh should I be doing this? (Gemma T2, 31 years, BMI=27, LSCS)

"I would do myself like 4 rounds of toast to take to work for breakfast. And I'd stop off at Tesco and get like 2 cheese pastry twists and a biscuit, a chocolate bar, crisps and I was spending like £3 a day on crap. And that would do me then." (Annie T2, 37 years, BMI=32, LSCS)

'I'm eating for two I'll just eat like a pig'

Several participants suggested that pregnancy could be seen an 'excuse' to eat in excess, and that this would lead to problems with weight after the birth. The women identified acquaintances that they felt had used pregnancy as an excuse to eat

"Another girl at work she was dictating to me and she said oh I just ate what I wanted. And I'm thinking Ok. And she put on lots of weight because she thought it as an excuse to eat lots of chocolate." (Annie T1, 37 years, BMI=32, NVP)

"Some people I suppose would use it as an excuse to eat what they want because they are going to be fat anyway." [laughs] (Emma T1, 22 years, BMI=27)

"Like my friend who's pregnant now, she is getting her husband to go out and get 3 McDonalds a night, and she is putting on a ridiculous amount of weight." (Olivia T2, 22 years, BMI=28, NVB)

Some recognised that pregnancy could be seen as a time in which it was acceptable to over indulge but were determined not to use as an 'excuse' particularly as they feared putting on too much weight.

"It's like an excuse. People think it oh I'm eating for two I'll just eat like a pig. But I don't want to be doing that because I know how much I've struggled with my weight and it's difficult for me to maintain anyway. So I don't want to be in a position that I've got loads and loads and loads of weight to lose after the baby's born." (Claire T1, 26 years, BMI=32)

"Yeah I would like to lose the weight after pregnancy. I don't want to just use it as an excuse. Like. I've had kids that's why I'm over weight, sort of thing." (Mary T1, 25 years, BMI=32, NVP)

This viewpoint would indicate that participants were making judgements about excessive weight gain being the result of gluttony, and it would appear that there was a fine line between relaxing previously controlled eating behaviour and over indulging.

'I'm still trying to learn the signals and the signs of my body'

Activity levels and exercise were also behaviours that were determined by participants listening to their body, and during the first trimester this usually meant that both were significantly reduced due to high levels of tiredness, typically experienced during early pregnancy.

"Because you don't want to push yourself too hard and it's that thing of especially when you are in your early stages. And that's one thing I've struggled with is knowing when to stop. Like. What cause my body is only just starting to tell me and I'm still trying to learn the signals and the signs of my body saying, you know "hang on" stop, sit down, take five. Drink (giggle) whereas before it was ok for me to just sort of ignore it go through. You know, carry on. Actually now it's not." (Fran T1, 25 years, BMI=31)

"You know I will have come in and sat down and I've gone to sleep for an hour. And I know that I would never have done that before. So I keep thinking well if that's what my body is telling me to do then, just roll with it for now, and see how it goes". (Jane T1, 31 years, BMI=25)

For some of the women the last trimester left them feeling restricted in their movement due to the physical changes to their body and their changing shape, thus listening to their body meant that they slowed down their activity levels.

“But I felt like, looking back now, I feel I could have done more exercise than I did, but, at the time I did what I felt was enough for me. And when I got to 35, 36 weeks, I really began to feel quite weighed down and stuff then. And it was quite awkward to move about”. (Mary T2, 25 years, BMI=32, LSCS)

Fran reported that at one point she felt that she had ‘over done it’ and as a consequence found herself in pain.

“But there was a couple of times where I did push it a little bit too far, I got into town, walked around, did whatever shopping and stuff, got half way back and had to sort of stop. And the only way, I could stop the pain was by crouching down. (Laughter) Just give me a couple of seconds! Yeah, pregnant lady crouching down on the floor! Just give me a couple of seconds and I’ll be just fine!” (Fran T2, 25 years, BMI=31, LSCS)

It is therefore understandable that because she listened to her body, she had reduced her levels of activity and ‘taken it easy’. However, this slowing down the pace, was not the case for everyone. In contrast, one participant found the latter stages of pregnancy gave her a clear sense of health and wellbeing that meant she had improved energy levels, and although people around her would suggest she should reduce her activity, instead Hannah listened to her body and continued to be active.

“Some people in work were saying, oh Hannah when are you going to realise you’re pregnant. You need to sort of stop doing stuff. And I was like, I don’t want to sit on my arse and do nothing. I’ll just go along with how I feel, how my body feels and I just felt really, really well. So I didn’t do any running or gym exercise. But I did keep active.” (Hannah T2, 36 years, BMI=28, NVB)

Pregnancy is a time of flux for many women where their physical, social and psychological identity is adjusting. It would seem that these changes can affect dietary and physical activity behaviours. Behaviours that are valued outside of pregnancy, for example pursuing the ideal slim body through diets and fitness, are at odds with those behaviours that are valued in pregnancy. In adjusting to this new identity, the participants in this study appeared to put faith in their body and listened to its cues, which informed their eating and physical activity behaviours. However they recognised that when it came to diet, there was a fine line between listening to the body and being seen as overindulging or gluttonous. Listening to the body was not only valued by the participants but also their family and friends supported this view.

3. 2. 2. 5 Theme 5: Needs of the baby

As may be expected, when making decisions about changes to lifestyle behaviours the women would not only take into account their own needs and wishes but also the requirements of their unborn baby.

'Because it's for the baby now isn't it'

Participants reported that they viewed a healthy lifestyle during pregnancy in terms of what was considered healthy for their growing baby.

"Cause with me, it was in my mind anyway. You know before pregnant. You should eat healthy, cause it's not just you, you need to think of the baby now. That's the way I have always thought about it. You know since I've fallen pregnant that's the way I've thought." (Imogen T1, 29 years, BMI=26)

"I'm not a fan of breakfast. I can't eat when I first get up. But I like, wait like an hour or so, and then make myself eat it. Because it's for the baby now isn't it?" (Paula T1, 20 years, BMI=30)

For some women the needs of their unborn baby were at odds to their own which led to a conflict of interest. This conflict of needs was seen in both eating and physical activity behaviours; on the one hand they would want to pursue behaviours that pertained to their long-term health and sense of wellbeing, for example limiting their weight gain, whilst on the other hand they felt that the needs of their unborn baby required them to consume more calories and to gain weight.

"I think, well, I'm not going to worry about it too much. I just think that I am going to have, what I can have, you know... and I'd rather get the goodness of the fruit and veg in, even if it means that I do have to have the extra calories. So it's like a bit of a trade-off really. So I'm not bothered that that orange juice has got more calories than an orange I just know that it's got the goodness in it, so I'm going to have it anyway." (Jane T1, 31 years, BMI=25)

This conflict of needs was especially evident with Bethan, who prior to pregnancy had lost weight through strict dieting and so she clearly felt torn between her unborn baby's needs and her own to control what she ate and therefore how much weight she put on.

"And it's like I've gone from like having three meals to having two. And my Nan is like you shouldn't be trying to skip your

food, because the baby needs food as well. And I'm just like. (sighs) So I feel guilty. I've gotta feed the baby but I don't want to feed myself. Because I don't want to put anything on.. There's nothing else you really can do because you're going to put a bit of weight on anyway. You just have to accept it."
(Bethan T1, 20 years, BMI=34)

It is evident that although she demonstrates ambivalence regarding her eating behaviour, and thus her weight gain, Bethan is resigned to the fact that weight gain is an inevitable part of pregnancy and she is unable to prevent it.

'I just think of the baby. I'm forgetting about myself'

It was noticeable that when participants expressed a conflict of needs they would clarify that their baby's needs took precedence over their own.

"Um. And whatever happens afterwards, that's just me. So I can deal with it. But as long as everything's ok for the baby, then that's fine. So yeah." (Fran T1, 25 years, BMI=31)

"But like everyone's like 'you shouldn't do that, you shouldn't pick that up' and I'm like 'I'm fine'. But you have got to listen sometimes. There's two of us now." (Paula T1, 20 years, BMI=30)

So for many of the women, the focus tended to be on the health of their unborn baby, and although this was not always at odds to their own health, very often lifestyle changes were motivated by the needs of the fetus.

"I just tried to make sure I ate more fruit and veg. Kept up with making sure that I am having my five a day. And I was quite conscious about that as well. More so for him, I probably should have thought for me as well. But I think you just, your mind takes over and you think. Make sure he's getting enough." (Claire T2, 26 years, BMI=32, NVB)

"It's, to be honest, I just think of the baby. I'm forgetting about myself. [laughs]. Well everything's oh the baby needs this, the baby needs that. But I probably forget about myself, forget what I should be eating but... Do you know what I mean?" (Claire T1, 26 years, BMI=32)

On the other hand, Kate's attitude appeared to be slightly less fraught as she identified that her unborn baby's needs were predominantly in line with her own in that she needed to be healthy for herself as well as for her baby.

“It’s trying to be healthy so that there’s a balance, so I’m not trying to cut anything out, um. But yeah. I think it’s everything within reason at the moment. Trying to get the balance without putting on loads, and making sure that we are both getting what we need. So, yeah, just the balance.” (Kate T1, 28 years, BMI=36)

In making any decisions about dietary and physical activity behaviours participants would consider the needs of their growing baby. This is not surprising as there is an expectation for pregnant women to put the needs of their unborn baby before their own. Perhaps this selflessness during pregnancy is a trait which is valued by the wider society as an indication of their readiness for motherhood where their infants’ needs should take priority.

3. 2. 2. 6 Subordinate theme: Risk

In amongst all the themes identified, there appeared to be an underlying theme of risk. It would seem that participants were fearful of things ‘going wrong’ be that problems with their health or with their baby. There was a sense of danger, which given that these participants were classified as being ‘low risk’ by their midwife was a surprising finding.

‘Is the baby getting anything?’

For some women, the NVP experienced was seen as risking the health of their baby especially as many felt that the symptoms prevented them from getting adequate nutrition and this left them anxious that their inability to eat due to the nausea would deprive their growing infant of nutrition.

“I used to have cereal and then I’d throw it all up. And I’m Like I used worry then because I’m like ‘Is the baby getting anything because I keep being sick?’” (Bethan T1, 20 years, BMI=34)

Although several women were anxious about the risk their NVP had on the health and development of their baby, only Nicola was diagnosed with the most extreme form of

NVP; hyperemesis gravidarum¹⁵ and following a brief admission to hospital and treatment, this had resolved by the time of interview.

'Am I going to get listeria?'

When participants were asked about the food to avoid during pregnancy all but one identified those food stuffs associated with infection. Participants had been counselled by their community midwife during their first meeting regarding the high risk foods they should avoid to prevent infections or foods that are known to be teratogenic¹⁶ and it would seem that this information was taken on board by the women.

"You know shell fish and sea food. I've not had any of that. I've not had a medium rare steak, bless. For like about 4 months. Since before I was pregnant. That's my favourite. Blue cheeses and all like unpasteurised cheese. So I've pretty much cut out. Rather than should I? Is that one safe? I'm not even going to attempt even if I think it's ok." (Claire T1, 26 years, BMI=32)

"I remember going out to the Harvester for a meal, I think it was dad's birthday, I can't remember. I was thinking, oh I'll have salad cart, but then I was a bit sort of like oh, I don't fancy it and as well, is it all clean. Because you know yourself if you've cleaned it. So with that as well I was a bit, well. I stuck with chicken and chips that day." (Nicola T2, 29 years, BMI=27, NVB)

Nicola's anxiety around the risk the salad posed and therefore her choice to opt for chicken and chips almost seems counterintuitive, yet for her, the safety aspects of the food were paramount and therefore the 'healthier option' could be sacrificed. Nicola was not the only participant to raise concerns about the safety of salad;

"I wasn't as healthy as I could have been because I tended to shy away from almost everything. You're thinking a bread roll can't hurt me, I'll eat that. You know that kind of thing and all of a sudden it will pop up like "oh I hope you've washed your salad again because" and I mean I didn't eat salad for ages, and I had lived on salad. Because in a restaurant and things, I'm still a bit wary, thinking have they washed that properly? Am I going to get toxoplasmosis, you know or am I going to get listeria." (Jane T1, 31 years, BMI=25)

It appears that participants identified that foods which should either not be consumed or limited during pregnancy were centred around the avoidance of disease rather than

¹⁵ Hyperemesis gravidarum is the most extreme form of NVP where the nausea and vomiting actually prevents adequate intake of foods and fluids which leads to dehydration and weight loss, sufferers often require hospitalisation and treatment in the form of intravenous fluids and antiemetic medication.

¹⁶ Teratogenic is a medical term for the harmful effect of a substance on the development of the fetus.

the promotion of health. Women therefore chose to avoid foods that they categorised as 'risky' for their pregnancy but foods that were high in fat and/or sugar did not appear to be included within this category. Some women recognised that their anxiety meant that they might have been a little too cautious with the foods, but still they felt it best to err on the side of caution.

"I think I was quite careful as well. Because you read about the foods you shouldn't eat and stuff like that. And I think I was a bit too careful, with some things. You know like eggs and stuff. I didn't really have them because I didn't know if I was cooking them right. So I kind of cut them out. And I was saying to my husband, I don't know if I've done this right now, because obviously she needs to get some things, but I don't want to, you know, risk it type of thing. I wasn't sure if I was going a bit OTT with it." (Nicola T2, 29 years, BMI=27, NVB)

Exercise was also frequently referred to in terms of the risk it posed to the fetus, and this was especially evident when discussing appropriate levels of exercise.

"Before I was pregnant. I was doing like exercise DVDs and stuff. And when I got pregnant, I stopped all that. I thought. I'd better not be jumping about the place with a baby. So I suppose I really got less active when I was pregnant." (Mary T2, 25 years, BMI=32, LSCS)

"And I think I would rather suffer the unfitness after the 9 months and recover from that than try and keep it up and end up hurting myself or the baby." (Jane T1, 31 years, BMI=25)

Participants were keen not to 'over do' exercise as this was thought to be harmful. Several women felt that information regarding safe exercise during pregnancy was limited. As noted earlier, some participants believed that pregnancy was not the time to commence new activities. In the absence of midwifery advice regarding exercise, some would seek out information from external sources such as family or friends or the internet. However this led to some confusion regarding what was considered to be a 'safe' type and amount of exercise and as a result left the women feeling that no exercise may be considered the safest option.

"I didn't know what to expect and I didn't know what was enough exercise and I didn't know what wasn't. You know what was recommended. I kind of just left my lifestyle as it was. because we've got a treadmill. I didn't go on that because I didn't want to, you know. I wasn't sure if it would harm things at the beginning." (Debbie T1, 28 years, BMI=30)

"You want to get past that 12 week milestone. So I stopped all my exercise and that. But I was still walking places and stuff. I

don't think you should go to the gym or anything like that. I haven't made any changes really with exercise. I'm thinking more sort of, after pregnancy I will try and get more exercise in there, and introduce something there.” (Mary T1, 25 years, BMI=32, NVP)

This sense of risk around exercise led the women to consider participating in ‘safe’ or ‘supervised’ classes specially designed for pregnant women to ensure that they were not endangering themselves or their unborn baby. It would appear that they did not trust their ability to judge whether an activity undertaken was safe, rather they wanted to assign the responsibility to a trained expert.

“So walking I'm fine with. But if I was going to do anything more than that, I would probably want to be in a supervised environment. With somebody who would make sure that I wasn't doing anything that's going to hurt myself.” (Jane T1, 31 years, BMI=25)

As already noted under the theme managing weight gain (see page 122), a number of women stated that gaining too much weight during pregnancy would put them or their baby at risk and that therefore this was something that should be avoided. Indeed several voiced that pregnancy was not the time to be worrying about it as any weight gain could be tackled after the birth of their baby, when only they would be affected by dietary or exercise behaviours, without it having a detrimental effect of the baby.

3.3. Discussion

The objectives of this study were to explore the views and experiences of overweight pregnant women regarding gestational weight gain and their intentions pertaining to their dietary and physical activity behaviours.

The majority of women in this study saw the midwife as being a source of support and advice when it came to lifestyle behaviours and all had been provided with The Pregnancy Book as a source of information. However, it was reported that there was a possible oversupply of leaflets and literature and a lack of discussion with their midwife about healthy eating and exercise during pregnancy. It may be that the midwives see the supply of the pregnancy book negates the need for information giving and discussion relating the lifestyle behaviours. Kirkham and Stapleton (2001), in their research evaluating the use of evidence based leaflets in maternity care, identified similar issues. Their ethnographic study found that women tended to be inundated with printed material including the bounty packs, advertising material and informed choice leaflets. They too found that provision of printed material by midwives was often used in the place of a discussion, with women being advised to read them at home and 'come back with any questions', thus putting the onus on the women to facilitate discussion (Kirkham and Stapleton, 2001). Literacy skills within the locality are known to be low (City and County of Swansea, 2007) and as such, if information is being provided solely in the form of literature without an accompanying verbal discussion, some women may not get to receive the advice.

For a significant minority of participants the schedule of visits, particularly during the first half of pregnancy was limited and they would have welcomed more frequent opportunities to meet with their named midwife during this crucial period of time when they felt especially vulnerable. It is widely accepted that women appreciate support from their midwife during the antenatal period and view continuity of care as important (Soltani and Dickenson, 2005, Homer et al., 2002, Farquhar et al., 2000). The pattern of antenatal visits that low-risk women receive is determined by national guidance which recommends limiting the frequency to between 7-10 appointments during the course of pregnancy (NICE, 2008). In a Cochrane review of studies looking at patterns of routine antenatal care visits, it was shown that a reduction in number of visits did not increase adverse health outcomes for mother or offspring. However, it did show that fewer visits reduced women's satisfaction of their care (Villar et al., 2009), and the findings from this longitudinal study support this. With the current pressures on NHS

resources, including staff time, it is unlikely that increasing the number of antenatal visits will be viewed as a priority by those in charge of commissioning services, especially when it appears to have no benefit to biological health outcomes.

It was noted that in the absence of easy and ready access to health provider advice, some women would seek information from other informal sources such as family, friends and the internet as well as more novel domains such as phone applications. However, participants recognised the limitations of these outside agencies and would search around to ensure the information they had discovered was appropriate. It is apparent that pregnant women are turning to the internet and other new technologies in order to inform their decision making but that they do so with a degree of caution and will do extensive research to ensure they have the most appropriate and accurate information. This finding has also been noted by other researchers investigating internet usage in pregnancy (Lagan et al., 2011). The internet as a source of information is not available to all due to Information Technology (IT) literacy skills and issues with access. It should be noted that a large proportion of those women unable to access the internet in order to acquire information may already have the added disadvantage of poverty (Helsper, 2008).

The majority of participants viewed weight gain as an inevitable product of the growing pregnancy and this resulted in women expressing opposing views: Some accepted weight gain as a healthy natural process, whilst others found the increasing weight distressing. It may be that for some prior to their pregnancy, weight gain was seen as negative and therefore adjusting their view of it to something that is normal and healthy may prove difficult.

For many of the participants, most notably those with a history of successful dieting behaviour, pregnancy appeared to afford them the freedom from pressure to be slim and so they were able to relax their controlled eating patterns and this finding is supported by other research (Clark and Ogden, 1999). This freedom to eat what they 'fancied' without concern was seen as a benefit of pregnancy, and although participants had some anxiety that following the birth they would have gained some weight, they felt confident in their ability to subsequently lose that weight. It would appear that they were able to draw on the past success and as a result have confidence that they would be able to modify their weight following the birth through behaviour change. This idea is supported by psychological theory relating to behaviour change which suggests that self-efficacy is key to success (Deci and Ryan, 2002, Bandura, 1977a). If the participants have a history of achieving weight loss they have a

strong sense of self efficacy in their ability to achieve weight loss and this should stand them in good stead for managing their weight following birth.

Some of the participants were fearful of putting on 'too much weight' which would leave them being heavier after pregnancy than they had been before. They believed that gaining too much weight would not only increase their risk of further obesity but also cause possible pregnancy complications. However, this finding is in stark contrast to recent research. The study by Olander *et al.*, (2012) identified that pregnant women were unconcerned about gestational weight gain due in part to the lack of monitoring of weight changes by health professionals. The difference in findings may be explained by the sample characteristics. Olander's research did not target participants with a raised BMI but had mixed weight categories. Therefore a number of those participants will not have been overweight prior to pregnancy and thus might have less concern regarding their ability to 'manage their weight'.

The results of this study appeared to show ambivalence amongst participants regarding how they felt about gestational weight gain, but there was a clear agreement regarding health behaviours in pregnancy. Similar to other research findings (COI and FSA, 2007); these results confirmed that pregnancy was viewed by participants as a desirable time to make some key changes to lifestyle. At the antenatal interview, the women in this study had identified that they wanted to make improvements to their diet, specifically they cited goals to increase their fruit and vegetable consumption. They were also keen to avoid those foods that they understood to pose a risk to the health and development of their unborn baby. The women had evidently understood and incorporated the health protection messages regarding safe eating practices in pregnancy. What is interesting is that they appeared to be less concerned with promoting or enhancing their health through limiting the consumption of 'unhealthy' foods that were high in fat and/or sugar. It is not clear why this may be. Perhaps it is due to saturation of health messages. Healthy eating is promoted in a number of health campaigns directed at the general population such as the Change for Life (DOH, 2009a), and it also receives a significant amount of media coverage from advertisements, via television programmes and magazines. This may be seen as a seemingly endless flow of healthy eating messages which may leave people feeling it is not tailored or relevant to them. On the other hand disease avoidance messages relating to diet in pregnancy are novel, finite, specific and targeted which may be why women feel they are targeted directly at them, although this finding has not been identified in the literature.

From the outset of pregnancy the participants faced a number of barriers which thwarted their behavioural intentions. Nausea and vomiting in pregnancy (NVP), a common symptom experienced in the first trimester, was frequently cited as a barrier. Those women afflicted with NVP found that it prevented them from consuming a healthy balanced diet, and it was also often responsible for food aversion. Typical food aversions experienced by the participants were vegetables, fruit and meat. In a bid to prevent bouts of NVP women would consume energy dense snacks such as biscuits and sweets throughout the day, and indeed avoiding meals and eating frequent snacks is a recommended method of managing NVP (Pregnancy Sickness Support, 2013, DOH, 2009d). Thus, those who experienced NVP found it particularly difficult to consume what they considered to be a healthy diet for pregnancy, and even when the NVP had subsided later in the pregnancy the food aversions persisted.

Financial constraints were identified as a barrier to healthful eating; however at the point of interview the women were still able to receive the Health in Pregnancy Grant, a one off payment of £190. This universal tax free grant was established in 2009 by the then Labour Government and was given to all pregnant women as a means to tackle the notion that a healthy diet was unaffordable. This grant was paid directly into the recipient's bank account and therefore could be spent on items other than healthy foodstuffs; the grant was subsequently abolished in 2011 as part of a number of benefit cuts to reduce the governmental welfare costs. Other barriers to healthful eating were found to be tiredness, and a lack of time. With all but one of the participants in this study working full time, this obviously has implications for their energy levels and amount of leisure time available to them.

There appeared to be a general consensus that maintaining a healthy lifestyle during pregnancy, specifically limiting foods high in fat and/or sugar and exercising frequently, were health behaviours that were focussed on the woman and not her growing fetus. These behaviours were noted as desirable either before or after pregnancy, as a means to manage weight, but that these should not be carried out during pregnancy. This is in direct contrast to the advice being given to women through the Pregnancy Book and it may be that women view the limiting of foods that are high in fat or sugar as being considered 'dieting' (i.e. having a calorie restricted diet), something which is actively discouraged during pregnancy. Perhaps this is an area in need of clarification for women? A healthy balanced diet where energy dense foods are limited does not necessarily constitute a calorie restricted diet rather it should be seen as a healthy and appropriate diet for all women to achieve, including those who are pregnant. Similarly

regular exercise was not always viewed as a way to maintain health and fitness but rather it was viewed as a means to achieve weight loss which would explain why it could be considered an undesirable behaviour during pregnancy, this finding is supported by other researchers (Weir et al., 2010). These behaviours (limiting energy dense foods and exercising regularly) can assist women to manage their weight gain, however often their role appears to be affiliated with weight loss. There is a subtle but crucial difference in these two concepts; managing weight gain and losing weight which has not been identified in the literature but I feel is worth exploring. Weight gain is a normal, healthy and expected outcome of pregnancy and to prevent gestational weight gain through encouraging dieting would be considered detrimental to the woman and her growing fetus and should be avoided (DOH, 2009d). However, managing weight gain through eating a balanced diet including, limiting energy dense foods and commencing and/or maintaining activity levels during pregnancy is not only appropriate but should be actively encouraged. Therefore it may be necessary to have a discussion with women about how they view managing weight gain and losing weight which explores and differentiates between these two concepts.

Other than dietary changes, many of the participants had firm ideas about exercise during pregnancy, with several women confused and at times fearful about the prospect of undertaking what they considered to be 'inappropriate exercise', which could be harmful. Commonly, women expressed a lack of information and advice about exercise during pregnancy. As other researchers have identified (Gaston and Cramp, 2011, Clarke and Gross, 2004), those who prior to pregnancy would exercise on a regular basis, once pregnant all but one decided to stop their usual exercise as this was thought to be the safest option. Instead participants suggested that they intended to undertake what was considered to be more appropriate forms of exercise specifically provided for pregnant women in the form of aquanatal and pregnancy yoga. These structured classes were thought of as both safe and appropriate and were therefore desirable classes to attend. A significant number of participants also identified walking as a safe, appropriate and gentle activity that could be continued throughout pregnancy.

However, during the postnatal interviews it was apparent that none of the participants who initially expressed an interest were able to attend the structured classes. Cited barriers to attending aquanatal or pregnancy yoga were the timing and availability of classes. The limited availability of resources was identified as a theme in the initial study with Antenatal Clinic Managers. The NHS is experiencing increasing financial

constraints, and providing a number of classes at times to suit all would not be feasible. Other barriers that were identified as preventing them from participating in pregnancy specific exercise classes were that of cost and body image. For some women attendance at aquanatal classes was ruled out due to a dislike of the look of their body in a swimming costume. For others the cost of attendance at classes was prohibitive. These issues could be addressed through identifying ways to build exercise into part of their everyday routine such as walking to work, taking the stairs instead of the lift, reducing their car usage where possible; these small changes to their everyday behaviours may be preferable and would avoid some of the barriers women faced with the structured exercise classes.

When asked about whether participants felt they had done the right amount of exercise during their pregnancy the majority of them responded in the negative. Many felt that they should have done more, but in the end did not.

The results of this study would imply that although participants frequently reported that they intended to eat a balanced and healthy diet, avoiding unhealthy snacks or meals and intended to commence regular exercise, many were unable to fulfil these goals and this provides support for the intention-behaviour gap identified in the health psychology literature (Sutton, 1998) It would appear that the motivation which initially identified healthy lifestyle goals was unable to sustain this behaviour throughout the course of the pregnancy. It is known that motivation is an important factor in achieving health goals but behaviour change is more complex than simply having 'a will' to change, especially when confronted with barriers, Motivation is not a static concept (see page 57) and in the face of barriers motivation to change behaviour may decrease. Building upon the initial motivation and encouraging self-efficacy and self-regulation may assist women to maintain behaviour change (Thirlaway & Upton 2009), and this may be an area that midwives could consider in their interactions with women.

Diet during pregnancy was influenced by the internal drivers; cravings and aversions. These impulses were evident in discussion with the women about their eating behaviours and would often be referred to as 'listening to the body'; if the body desired something it should be fulfilled. These drivers suggest a degree of non-volitional eating behaviours where the participants reported being unable to stop themselves consuming foods that they knew to be unhealthy. The cravings and aversions appeared to thwart the individual's intentions and motivations and as such impacted upon their ability to self-govern their diet. It is almost as if the pregnancy itself negatively affected their sense of autonomy. Pregnancy is a time when women's

identity can be seen as being in transition. Society no longer views her as just a single person rather she is viewed as a mother-to-be, housing a growing fetus to whom she has a responsibility. The feminist literature which discusses the social construction of pregnancy highlights why this stage in a woman's life may diminish her sense of autonomy. Johnson (2010) suggests that the pregnant body is seen as a dichotomy. Often women feel their pregnant body as being both alien to them whilst at the same time, having a deep connection to it, and that this sense of ambiguity serves to undermine autonomy. Johnson suggests that in order to counteract this ambiguity, women and their care providers should discuss the pregnant body in more empowering terms (Johnson, 2010). Perhaps then, if health professionals, namely midwives, can provide an environment where food cravings and aversions during pregnancy can be explored and addressed in a way that promotes and supports a woman's sense of autonomy and control, it may be that these barriers to healthful living can be overcome.

Listening to their body also negatively impacted upon the amount of exercise or activity that participants carried out. The tiredness often experienced by participants was cited as a barrier to exercise and this has been identified by others (Symons Downs and Hausenblas, 2004, Weir et al., 2010). Although it may seem counter intuitive, low intensity exercise can actually reduce symptoms of fatigue and increase energy levels (Puetz et al., 2008). Daily exercise during pregnancy can also help women adapt to their changing shape, cope with labour better and aids more restful sleep (DOH, 2009d). Therefore when it comes to physical activity in pregnancy, when a woman is feeling fatigued, instead of reducing activity if instead she commences and/or maintains moderate amounts of exercise it may assist to improve her energy levels and maintain her general fitness.

As may be expected, when participants were making decisions regarding changing lifestyle behaviours during pregnancy, the needs of their baby were taken into consideration. On the whole the women reported that this meant changes to their fruit and vegetable intake and avoiding food and exercise that was considered unsafe or risky. Although some women recognised the needs of their baby and their own were aligned, this was not always the case. It was evident that for some participants the needs of their unborn baby were at odds to their own needs which led to a conflict of interest, and was especially evident when it came to dietary behaviours and weight gain, and could be seen as evidence of the dichotomy that Johnson (2010) describes, which can serve to undermine a woman's sense of autonomy. Women were eager to make sure that their baby was getting ample nutrition through their own diet, yet some

women were balancing this against the desire to restrict their weight gain. However, participants were keen to stress that their unborn baby's needs took precedence over their own, and thus they would 'deal with the consequences' after the birth, when, if they desired, they could resume a programme of weight loss without impacting upon their baby's health. This finding is consistent with the qualitative research exploring the views of pregnant women with above average weight carried out by Wiles (1998), which found that the wellbeing of the unborn baby was of key importance to women when making decisions about weight management. Perhaps, therefore it may be helpful when discussing dietary and physical activity behaviours with pregnant women that midwives assist them to view that their unborn baby's needs are in line with their own; eating a healthy well balanced diet that limits high fat and/or sugar as well as commencing or maintaining moderate physical activity will benefit the development of their baby as well as their long-term health and their weight.

The subordinate theme of risk was very prominent throughout the interviews, with women clearly voicing their concerns and fears of causing harm. Women were quick to disclose that they avoided foods that were viewed as a potential source of disease and viewed these foods as a real threat to the health of their pregnancy. NVP was also seen as a potential threat with women anxious that their growing fetus may not be obtaining the nutrition required for fetal development from their restricted diet. And exercise too was thought of in terms of risk with several women feeling that their usual forms of exercise may cause harm to themselves or to their unborn baby. This finding is not new and has been identified by other researchers (Clarke and Gross, 2004, Weir et al., 2010).

Why is it that these women, who are considered to have 'low risk pregnancies' are so preoccupied with the threat of risk? In the UK women booking for maternity care are assessed and categorised into either Consultant Led Care, for those women deemed as having a more complicated pregnancy with some degree of risk, and Midwife Led Care for those women deemed have straightforward pregnancies with no underlying risk factors. There is a nationwide professional drive for midwives to reduce what is considered to be unnecessary intervention and to protect normality (RCM, 2010a). Yet in carrying out a risk assessment upon all women in early pregnancy to determine which profession will be the lead carer, are midwives over emphasising the role of risk in pregnancy? There is also the issue of the booking visit where women are informed about the range of antenatal screening that is offered and are required to make decisions as to whether to accept this screening. The screening itself is centred around

risk; risk of maternal disease, risk of fetal abnormalities and risk of harm to fetal development. This booking appointment is also when women are routinely advised on health in pregnancy and avoiding disease or harm. Is it any wonder that the participants in this study are so fearful of actions that may be of detriment when the discourse they have with their midwife is centred around risk? This quandary that the profession finds itself in between the avoidance of risk and promotion of normality has been widely discussed in the professional literature (Scammell, 2011, MacKenzie Bryers and van Teijlingen, 2010, Walsh et al., 2004). And the evidence from this study suggests that these professional dilemmas may in turn become public dilemmas. A woman-centred approach to maternity care has been advocated in a bid to enhance women's sense of autonomy in the provision of care (Leap, 2009), I would argue that an over emphasis on risk avoidance can shift the focus from woman-centred to a more risk-centred care and in doing so may undermine an individual's sense of autonomy. Perhaps by moving towards a more health promotive stance where midwives facilitate behaviour change in a more positive light (such as asking what a woman would like to do to be as healthy as possible during pregnancy as opposed to advising them to avoid behaviours), may serve to enhance their sense of autonomy.

Study Two has strengths and limitations. A strength of this study is that there was no loss to follow-up as all participants were interviewed at both time points and although the topic area may be seen as being a potentially sensitive one, it was evident that the women who participated in this study were keen to take part in the follow-up interview. The findings of this study are based on a small sample of overweight pregnant women, and as such should not be used to generalise findings to other populations. A limitation of this study was that all participants were aware of my role as a practising midwife, and although I was not involved in their clinical care I did answer basic questions that arose during the course of the interviews referring them back to their own midwife if their questions were deemed to be more complex or clinically relevant. Therefore it may be conceivable that participants' responses to my questions were affected by knowing my profession. This may have resulted in them providing answers that they felt to be more 'socially desirable'. However I tried to reduce this by demonstrating a clear non-judgemental approach to their responses and several participants appeared to be very honest about their lifestyle behaviours often reporting behaviours that might not be seen as socially acceptable.

The findings of this study would suggest that women consider the way in which midwives communicate health messages regarding diet and exercise could be

improved. Women valued the support and information provided by their named midwife. But although they had been informed about foods to be avoided to prevent disease, they also reported that there was an absence of a discussion regarding a healthy lifestyle in pregnancy. Arguably, exploring women's perceptions of what they believe constitutes a healthy lifestyle will give midwives a sound basis for providing individualised support and assistance. Women appear to be highly motivated to make changes to their lifestyle behaviours to benefit their own and the unborn baby's health but their intentions are thwarted by a number of barriers, including it would seem, the approach of some health professionals. It may be that shifting the focus away from telling women what not to do, towards helping them to identify what they could do to promote a healthy pregnancy may do much to reassure them and elicit behaviour change. Put simply instead of health professionals focusing on risk avoidance during pregnancy, a more health promotive stance that works towards increasing intrinsic motivation, may prove to be more effective.

3.3.1 Theoretical review of the findings

The thematic analysis of the data has provided an insight into the views and experiences of this sample of overweight women regarding weight gain during pregnancy and the lifestyle behaviours that can determine it. However although motivation was described by participants, the analysis did not address the theoretical underpinnings of the motivational aspects that guided and shaped their behaviour. Therefore this section seeks to address this by exploring the quality of behavioural engagement using theory to provide a possible explanation of the influence that pregnancy has on motivation, behavioural goals and regulation of behaviour.

As was noted in Chapter one, motivation is understood to be pivotal to behaviour and plays an important role in determining whether behaviour change is successful or not (Michie et al., 2011). The motivations cited by participants ranged from the general e.g. 'wanting to be healthy' to more specific such as 'making sure the baby gets what it needs'. The participants rarely showed any evidence of amotivation regarding behaviour change, though this is not surprising. Any study which recruits participants to explore health behaviours is by its very nature going to attract those who are interested in this area and therefore is subject to sampling bias (Sanders, 2010). We cannot assume therefore that amotivation for behaviour change does not occur within this population.

Participants in the study identified a number of goals pertaining to their lifestyle behaviours and disclosed various motivations for determining these goals. When looking at health behaviours, pregnancy can be seen as a unique life stage, as motivation for personal behaviour change is not just influenced by outside others, or by the self, there is a more complicated element, and that is the perception of the needs of the unborn baby. And so by looking at maternal lifestyle behaviours during pregnancy, it could be argued that the self determination is inherently compromised when a woman takes into account the needs of her offspring, especially when these needs are seen to conflict with her own. She not only has responsibility for her own health, which is influenced by her social environment, but the health and wellbeing of the fetus is directly dependent upon her. Thus although the fetus is physically part of her, it can be perceived as extending an extrinsic influence that can both motivate and regulate behaviour (Pletsch and Thornton Kratz, 2004). Pregnancy is seen as an ideal time to tackle behaviour change due the added incentive of a growing baby (Phelan, 2009b), however pressure to behave for 'the benefit of the baby' may serve to undermine autonomous control. Throughout the interviews there was clear evidence that participants' perception of growing fetus' needs influenced their behaviour, and can be seen in the quotes from Claire and Debbie.

"I just think of the baby. I'm forgetting about myself. (laughs). Well everything's 'Oh the baby needs this. The baby needs that.' But I probably forget about myself, forget what I should be eating. (Claire T1, 26 years, BMI=32)

"Instead of thinking Oh I need a chocolate bar. I think oh no I can't – not that I can't, but I think it's better. Not for myself but for the baby. Now it'll be an apple or a banana. And so consciously I'm deciding to make judgments on eating better. You know eating more healthier foods" (Debbie T1, 28 years, BMI=30)

Both participants state that the motivation behind their behaviour stems from the perceived needs and wellbeing of the baby and both quite clearly believe that it is not about their own needs. And so we might say that their behaviour is extrinsically motivated and is being regulated by external pressures, although admittedly the external pressure from the fetus is emanating from within the physical self.

Social factors were often identified by participants during the interviews as influencing their motivation and in turn, their behaviour. Sometimes this influence would be directly as the result of a significant other displaying concern for the health and well being of the individual and this was seen as being supportive and nurturing such as the views

expressed by Hannah and Claire when talking about their partners' influence on behaviour.

“So I think that my husband is very food conscious. He's very health conscious, and he does most of the cooking. He's been buying me like little nice cheeses that I might like which are pasteurised to try and get me to eat more calcium. Yes he is very supportive; he bought me some little Baby Bell cheeses the other day. Baby Bell is really nice. I'd never noticed that he realised I do like it, but he obviously had, so he just said, 'Oh I think you need some more calcium.'” (Hannah T1, 36 years, BMI=28, NVP)

“You know he can be quite encouraging... He's like: 'have a glass of water, have a nice glass of juice now' you know. 'You probably haven't drunk enough in work today'. And I don't sometimes and so it does me good I suppose having him tell me.” (Claire T1, 26 years, BMI=32)

These two participants view their partners' concern and advice as a positive influence on their behaviour. There was no evidence that participants found their partners' input in relation to their lifestyle behaviours anything other than positive, though this does not of course mean that this is a universally held belief. Indeed if they did experience their partners' involvement as an unnecessary intrusion they might not choose to disclose this. There was evidence that health behaviours that were valued and encouraged by significant others were also valued by individuals.

“You want to make sure the baby is getting everything it needs to and my husband is a bit like that as well. He's quite particular and he's really organised. So probably because of him I'm on Google saying : Right OK. I should be eating more of this and more of this and making sure I'm getting all of the vitamins” (Claire T1, 26 years, BMI=32)

As was noted by other researchers (Thornton et al 2006, Tovar et al 2009) it would seem that the influence of significant others played an important role in the health behaviours of this sample.

Other social influences on behaviour were noted. Several participants reported making observations of other pregnant women's behaviour.

“A girl at work she said “oh I just ate what I wanted”. And I'm thinking OK. And she put on lots of weight because she thought it as an excuse to eat lots of chocolate. (Annie T1, 37 years, BMI=32, NVP)

“I had one friend in work who completely redecorated her house during pregnancy. She was 38 weeks glossing her stairs and stuff, but she did admit then that she did over do it. And she

reckons she was a week early and that was probably why. Because she was working right up until she dropped” (Mary T1, 25 years, BMI=32, NVP)

Both Annie and Mary saw the behaviours of others as being unsuitable or unhealthy, and so judged their actions as being negative. This was noted with other participants, who frequently drew comparisons between their lifestyle behaviours and that of their friends and family, often in relation to weight.

“Like my friend who’s pregnant now, she is getting her husband to go out and get 3 McDonalds a night. And she is putting on a ridiculous amount of weight. But I didn’t do that at all.” (Olivia T2, 22 years, BMI=28, NVB)

“My sister in law, she’s had three children now and she ate whatever she fancied ever since she found out she was pregnant. She ate. And then she struggled losing the weight. But obviously she’s gone BIG. You know. I have seen a lot of people putting on the weight, and I have seen people look tidy throughout their pregnancy. So hopefully, I will look tidy.” (giggles) (Imogen T1, 29 years, BMI=26)

“My sister is a yoga queen and she swears by it. And my cousin, because she had done yoga for so many years, her labour was fine. No problems whatsoever. So obviously its ticking round in my mind that it’s really good. I do want to do it” (Olivia T1, 22 years, BMI=28, NVP)

Social Cognitive Theory would suggest that when an individual identifies with a role model, behaviour can be modified through observational learning (Bandura 1986). It would seem that observational learning affected participant behaviour within this study; when observing their social environment, participants formed ideas about other people’s behaviour and then modelled their own accordingly; when the behaviour was seen as ideal they would aim to replicate it but when it was seen as flawed often the participants would aim to avoid it.

The input of significant others also adds to the sense that for some participants, their behaviour was at times being extrinsically regulated. We can see evidence of this when Bethan discusses the interactions she had with her grandmother about the needs of her baby:

“And my Nan is like ‘You shouldn’t be trying to skip your food. Because the baby needs food as well’. So I feel guilty I’ve gotta feed the baby but I don’t want to feed myself.” (Bethan T1, 20 years, BMI=34)

As noted in the above quote from Bethan, she is motivated to eat healthily by sense of the perceived needs of the baby but it would seem that these needs are in direct contrast to her own, there appears to be a sense of goal conflict which leaves her feeling guilty. Deci and Ryan (2002) suggest that when guilt regulates behaviour it is classed as an extrinsic motivator. Bethan was not alone in displaying evidence of conflict.

“I sacrificed going for a run, cause I will just pick that up afterwards, you know, it will come back to me another time. Yeah it will be hard, but I think, well, I’ll give that up if I feel happier not thinking that I bump my baby around even more. Which I know is fine. It’s in the nice big sack of water, and the muscles and everything else that keeps it nice and safe. I still think I would rather not risk it. I’d rather not” (Jane T1, 31 years, BMI=25)

In this quote, Jane suggests that there is conflict between meeting her needs (in this case her need to exercise) and meeting the needs of her baby which she feels is at risk of harm if she were to exercise. It would seem that perception of risk is a motivating factor, and although she admits that the risk of harm is small, it is still thought to be significant enough to determine her behaviour. From the quotes we can see that participants display evidence of goal conflict. The goal to pursue a healthy lifestyle in the form of exercise is perceived as being at odds to their goal to protect their growing baby. So when an individual is in a position where two goals appear to be in conflict this requires them to weigh up how they feel about the two goals and decide which is most salient (Boudreaux and Ozer, 2013). Within the literature, goal saliency is predictive of behaviour but can be influenced by several factors such as motivation, context, and frequency of prior behaviours (El Dahr and Fort, 2008). Therefore at any one time, the decision that an individual faces as to which goal has most salience can differ, and this is noted in the following quote:

“I was very, very healthy at first, but as I got further through the pregnancy, I craved more and more chocolate. And about two-thirds of the way through. I had a really big craving for McDonalds, and ice-cream! (laughs) Easter Sunday all I wanted was ice-cream! Anything that was sweet. Anything. Anything that was sweet, that was what I wanted, so in the end it went from fruit to chocolate.” (Fran T2, 25 years, BMI=31, LSCS)

Fran’s reported behaviour demonstrates goal conflict; on one hand she wanted to eat healthily, yet on the other she desired chocolate. For her, as the pregnancy progressed her reasoned goal to eat healthily, which had been a strong motivating factor that regulated her behaviour, appeared to lessen when faced with an overwhelming desire to consume chocolate. There was clearly a goal conflict between her reasoned attitude

and her impulsive behaviour. Research undertaken by Hofmann and colleagues (2008) who investigated reflective versus impulsive influences on behaviour can shed some light on this. They suggest that 'situational moderators' shift the salience between reasoned goals and impulsive behaviour (Hofmann et al., 2008). The state of pregnancy could be seen as being one such situational moderator as the influence of impulse is commonplace with women frequently reporting 'cravings' and 'aversions' during this period. In order to overcome impulsive behaviours which may be at odds to healthy lifestyle goals, individuals will need to value the healthy behaviour over the impulsive desire. Behaviour will need to be regulated by a consistent, reflective and deliberate process it and therefore requires cognitive capacity (Rothman and Sheeran, 2009).

So we can see that achieving behaviour goals in the face of impulse requires individuals to be able to cognitively process their actions. However another important aspect of goal attainment is the individual's belief in their ability to overcome barriers such as impulsivity (Locke and Latham, 2002).

It could be argued that pregnancy not only increases propensity for impulsive influences, but it is also a time when the woman's body is undergoing significant changes which can undermine her confidence in her ability to act in a desired way; her sense of competence or self efficacy in achieving healthy lifestyle goals can be impeded by the physiological and psychological effects of pregnancy. So for instance an individual may feel they are less able to control their dietary intake when suffering bouts of NVP and food aversions. Or indeed they may feel unable to plan a programme of exercise when they are affected by the increased levels of tiredness that are commonly experienced in early pregnancy.

"I went off vegetables, there are only a certain few that I like anyway, but we used to have veg with most things but now I just seem to be going more for carbs" (Nicola T1, 29 years, BMI=27, NVP)

"To be honest with you I have been really, really tired. And so I have found that I am not doing as much [exercise] as I used to. Sometimes I'll come in and sit down and I've gone to sleep for an hour and I know that I would never have done that before" (Jane T1, 31 years, BMI=25)

Both Nicola and Jane had found that symptoms associated with their pregnancy had impacted upon and changed their behaviour, and although these common symptoms are predominantly a feature of early pregnancy there was also evidence in the

postnatal follow-up interviews that their influence extended far beyond the usual 12 weeks. Research has found that responses to earlier symptoms of nausea and vomiting can set patterns of behaviour that extended for the duration of the pregnancy (Bayley et al., 2002), and this would appear to be the case with some of the participants in this sample.

In summary, intention is central to most behaviour change theories with many identifying 'intention to act' as being a significant predictor of subsequent action (Montano and Kasprzyk, 2008). However, often there are other factors that can influence behaviour and despite 'good intentions', the individual may fail to act in the desired way. Pregnancy can be seen as a life stage that brings with it unique challenges that can in turn affect the motivation, sense of self-efficacy and the social environment of individuals. Motivation to pursue a healthy lifestyle was moderated by the perceived needs of the fetus and the influence of the partner or significant other. There was also evidence of goal conflict which left women with a sense of ambivalence. And common pregnancy complaints such as NVP, food aversions and cravings, and tiredness could be seen as disrupting the usual equilibrium and this appeared to impact upon the individual's confidence in their ability to manage future behaviours. The findings from this study demonstrate the very complex nature of behaviour change in a pregnant population.

3.3.2 Summary

The results of the first two studies suggest that both midwives and women see pregnancy as a key opportunity to improve and maintain health behaviours. The Antenatal Clinic Managers recognised that this was an area that required further attention to improve health behaviours of the pregnant population and reduce the number of women with obesity. It is evident that a significant amount of NHS resources is being targeted towards women with a very raised BMI with the aim of reducing the risks associated with obesity in childbearing. What was less evident was a more proactive approach to obesity prevention in the pregnant population across other weight categories. There was a lack of services designed to prevent women becoming obese as a result of their pregnancy, despite it being recognised that this was a pivotal time in the development of obesity for some women (Rooney and Schauburger, 2002, Linne et al., 2004). Maternity services in the UK are facing increasing demand on resources as a result of a rise in the birth rate combined with an increase in the number

of pregnant women requiring complex care due to their age and health circumstances (Warwick, 2012). Therefore providing additional services to prevent obesity during childbearing within an already overstretched service seems especially challenging.

The midwives felt that for some women, a lack of knowledge regarding healthy eating was an issue; although this view was not shared by all, as some midwives acknowledged that the relationship between women and their eating behaviours was a complex one. Other barriers to addressing weight with women included midwives' anxiety around a lack of knowledge regarding appropriate weight gain and nutritional advice, as well as concern that communication of messages may offend some women. On the other hand Study Two identified that women would welcome discussion and advice with their midwife about their diet and exercise during pregnancy. The majority of women had very strong and clear ideas about their intentions regarding eating and physical activity behaviours though they cited a number of barriers that thwarted these intentions. There also appeared to be two common misconceptions: firstly that limiting energy dense foods was considered to be 'dieting' and therefore something to be avoided, and secondly: that other than walking, only 'pregnancy specific exercise' was appropriate and safe to undertake.

The findings from both studies suggest that midwives are in a strong position to intervene through facilitating discussion and behaviour change with women who are highly motivated to make lifestyle changes during pregnancy. Interventions that are designed to alter the health behaviours of the general population are frequently unsuccessful and this is thought to be attributed in part, to the lack of theoretical underpinning (NICE, 2007). It would seem that the state of pregnancy provides some unique challenges that influence behaviour, and as was noted in study two, pregnancy appeared to impact upon both motivation and regulation of behaviour and this effect extended to the social environment where the influence of outside others often prompted actions. The self-determination of individuals to maintain behaviour change appeared to be compromised by the common complaints (such as NVP, cravings, aversions and tiredness) that are so frequently experienced as part of 'normal' pregnancy. Social context, self efficacy and autonomy were all seen as core constructs within the motivation and behaviour of this population and therefore the findings resonate with the explanation provided by Self determination Theory. As a result of this synergy a midwife-led intervention to facilitate health behaviour change in pregnant women was developed based upon this theory. The following chapter will describe and explain the theoretical framework of Self-Determination Theory that was used during

the development and delivery of the 'Eat Well, Keep Active' intervention, and how this was operationalised.

CHAPTER 4.

THEORETICAL AND OPERATIONAL FRAMEWORK FOR STUDY THREE

Introduction

From the two preliminary studies it was recognised that an intervention designed to support women to eat a healthy balanced diet and maintain physical activity would need to address several areas. Firstly it would need to support women to view healthy lifestyle behaviours as not only safe for their developing baby but also as desirable and important during pregnancy. To do this it would need to shift the focus on these behaviours away from the often negative and disempowering language of risk towards a more positive proactive approach where women could feel they could act to promote their health rather than take avoidance measures to evade harm. Secondly the intervention would need to promote women's sense of autonomy and control regarding their behaviours. The intervention also needed to build women's sense of confidence in their ability to successfully achieve a healthy lifestyle. In order to be considered viable in the already overstretched NHS maternity services it would need to fit in to existing maternity service provision, not be considered to be time-consuming and be fairly straight forward to implement. And so from this the midwife-led 'Eat Well Keep Active' intervention was developed.

This chapter will look at the theoretical underpinning for the intervention study. Firstly Self-Determination Theory (SDT) (Deci and Ryan, 2002) and its relevant sub theories will be explored, followed by an investigation of the counselling technique of Motivational interviewing (MI) (Miller and Rollnick, 2002) and Goal Setting. Finally parallels will be drawn between the two models with the aim of providing an overall integration of the two approaches and will form the schema for Study Three.

4. 1. Self-Determination Theory

Self-Determination Theory (SDT) is a theory of motivation developed by Edward Deci and Richard Ryan which encompasses an organismic and dialectical framework for the theory of personality growth and development (Deci and Ryan, 2000). Pivotal to the theory is the notion that people have a natural propensity toward personality growth and development, this organismic principle proposes that human nature drives people to explore and seek new challenges and in doing so, further develop their sense of self. Deci and Ryan state that:

“..it is the adaptive design of the human organism to engage interesting activities, to exercise capacities, to pursue connectedness in social groups and to integrate intrapsychic and interpersonal experiences into a relative unity.” (Deci & Ryan 2000 pp229)

SDT acknowledges that although this drive toward personal growth is innate, it does not occur automatically; rather it is influenced by interpersonal factors which can either support and maintain or hinder personal growth. It is this interface between the organismic tendency toward growth and the social context that provides the dialectical element to the theory and can be used to make predictions about behaviour and behaviour development (Ryan et al., 2011).

Intrinsic motivation is regarded as the prototypic exhibition of the organismic tendency, put more simply it demonstrates clearly the natural tendency that humans have to grow and to develop. For example intrinsic motivation may drive an individual to find a solution to a problem, not because they are expecting a reward but simply they enjoy the process and challenge of finding the solution.

Deci & Ryan chose to carry out experiments on the effects of external rewards on intrinsic motivation. The early studies found that when external reward, in the form of money was given to individuals, their intrinsic motivation decreased, however when praise was given this led to greater confidence and increased intrinsic motivation (Deci, 1971). This finding was replicated by numerous studies and a meta-analysis of the studies concluded that external rewards serve to facilitate an external perceived locus of causality, that is to say that external reward seemed to undermine the self-determined aspect of the behaviour (Deci et al., 1999).

The theory identified three innate fundamental psychological needs that must be met for effective psychological health and development, they are: competence, relatedness and autonomy. Unlike Maslow's notable theory of human motivation (Maslow, 1943),

these needs are not hierarchal. They are however, universal and relevant across cultures, and although individual and cultural difference might place greater emphasis on some, all needs require fulfilment for optimum psychological health (Deci and Ryan, 2008b). Therefore a social environment that promotes the satisfaction of all three of these needs would predict healthy psychological development where personal resources are developed for engaging in adaptive self-regulated behaviour. Equally one that thwarts and obstructs the satisfaction of one or all of the needs would predict a pathological psychological development (Ryan and Deci, 2000).

These three psychological needs are explained in more detail in the next section

4. 1. 1 The psychological needs: Competence, Relatedness and Autonomy.

Firstly, competence refers to the ability to feel effective in one's actions. Within SDT it represents the psychological need to believe and feel confident in one's capabilities. This need compels individuals to seek out activities which support efficacy and thus builds on confidence.

Secondly relatedness refers to the need for interpersonal links, to feel connected to and have a sense of belonging to others and to the wider community. Essentially the need for relatedness reflects the deep-seated drive within human nature to be part of a wider society.

Finally autonomy refers to need to feel one's actions are volitional, and self-regulated. This need is fulfilled when people perceive that they are the origin of their decisions and are not being forced to do so by external sources. At first glance it might appear that the need for both relatedness and autonomy may be incompatible particularly when autonomy is so often equated to individualism, however, the theorists argue that these two terms should not be used interchangeably (Deci and Ryan, 2002). It is possible to be acting autonomously whilst taking into account the wishes and expectations of significant others, providing that the actions are in accordance with one's own beliefs and values.

SDT proposes that quality and not quantity of motivation predicts behaviour (Vansteenkiste et al 2006), and more specifically it is the most self-determined forms of motivation that are likely to yield results (Deci and Ryan, 2008b).

SDT provides classification for the differing types and quality of motivation and starts by differentiating between intrinsic and extrinsic motivation.

4. 1. 2 Intrinsic and extrinsic motivation

Although motivation is central to most theories of behaviour change (see page 57), SDT explores the concepts of intrinsic and extrinsic motivation in some detail. Intrinsic motivation occurs when an activity is carried out because it is enjoyable for its own sake. When experiencing intrinsic motivation the participant receives an internal reward for carrying out the behaviour and this reward acts to regulate the behaviour resulting in the activity being repeated. The internal reward tends to be in the form of feeling good, and positive about performing the activity, it may be fun or interesting. Intrinsic motivation is recognised as being the most autonomous form of motivation and is fully self-determined (Deci and Ryan, 2008a). This intrinsic motivation is a stable self-determined form of motivation and is conducive to the persistence of the behaviour (Deci and Ryan, 2002).

The majority of the behaviour that is carried out is not solely intrinsically motivated; for some people activities such as going to work or school, and often going to the gym or eating a healthy diet can be seen as being influenced by extrinsic motivation. These activities are carried out for a separable outcome and valued for reasons other than just the pleasure that they may give. Often it is a societal value that is placed on extrinsically motivated behaviours, or that they are seen as being worthwhile by significant others. SDT posits that extrinsic motivation can be further classified by the type of regulation that controls it whilst recognising that the degree of self-determination is key to the quality of motivation: This forms the basis for a sub theory of SDT called Organismic Integration Theory.

4. 1. 3 Organismic Integration Theory

Deci and Ryan (1985) proposed that instead of motivation being a unitary concept it should be viewed in terms of a continuum, with extrinsic motivation being sandwiched between amotivation and intrinsic motivation.

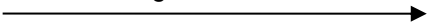
At one end of the motivation spectrum is amotivation, which can be described as the state of lacking the desire to engage in the activity in question and thus is deemed to be an absence of motivation. Motivation can be further categorised by the type of regulation that controls it. With amotivation the theorists argue that there is non-

regulation of behaviour and therefore the quality of the behaviour is therefore said to be non self-determined.

At the other end of the spectrum is intrinsic motivation, where the regulation is said to be intrinsic to the behaviour and is the most self-determined form of motivation.

Between these two extremes is extrinsic motivation which has four different regulatory classifications: external regulation, introjected regulation, identified regulation and lastly integrated regulation (see Table 9).

Table 9 The self-determination continuum

| Type of motivation | Amotivation | Extrinsic Motivation | | | | Intrinsic Motivation |
|----------------------|---------------------|----------------------|---|-----------------------|-----------------------|-----------------------|
| Type of Regulation | Non-Regulation | External Regulation | Introjected Regulation | Identified Regulation | Integrated Regulation | Intrinsic Regulation |
| Quality of Behaviour | Non Self-determined | | Increasing Self-determination  | | | Fully Self-determined |

Adapted from Deci & Ryan 2002

External regulation refers to the form of extrinsic motivation which is controlled through external means. Typically behaviour would be motivated by either some form of external reward (e.g. money) or through avoidance of a punishment. External regulation is a controlled form of motivation and is not self-determined. Behaviour that is controlled by external regulation tends to be short lived as it is contingent dependent. Once controls are removed, behaviour ceases.

Introjection, similar to external regulation is also a controlling motivation. However instead of the control originating from an external source, introjection involves the behaviour being regulated by reward or punishment emanating from the individual themselves. Behaviour is controlled by feelings such as pride or a sense of honour or the fear of guilt or embarrassment. Introjected regulation of behaviour is a slightly more persistent form of motivation than external regulation. Although the control stems from within the individual, the regulation is not fully internalised into a sense of identity or self and as such it is also not self-determined.

Identification is a more autonomous form of regulation, and entails the individual having a conscious acceptance of the behaviour as being important to achieving the valued outcome. This internalisation of the underlying values makes identified regulation a more stable form of motivation, and provides a strong incentive to override difficulties that may be encountered. Identification has increasing self-determination.

Integration takes place when the identified regulations are fully integrated into the individual's sense of self. The values of the behaviour are internalised and sit in harmony with their own values and sense of identity. Integration is the most self-determined form of regulation and is closely associated with intrinsic motivation, although the behaviour is valued for more than intrinsic enjoyment. As such integrated regulation ensures stability and maintenance of behaviour.

If motivation falls into one of the four categories, it need not remain within that classification; instead an individual's motivation can move from one end of the continuum to the other and visa versa. Deci and Ryan posit that it is possible to facilitate the integration of extrinsic motivation, by fostering support for the meeting of the three fundamental psychological needs: competence, relatedness, autonomy (Ryan and Deci, 2000). Therefore, an environment that supports an individual to feel competent to make behavioural changes, if those changes are valued by significant others, or the wider society, and if that person has increasing autonomy to make the decisions, then the individual can move from an externally controlled motivation to a more self-determined form. Likewise if the environment thwarts the meeting of the psychological needs this can impact on the quality of the behaviour and serve to undermine the individual's sense of autonomy, competence and relatedness. This can lead to demotivation of behaviour, where motivation becomes less self-determined. Being forced to carry out a behaviour that does not sit with one's own values, can damage feelings of autonomy and unified sense of self. Receiving negative feedback can foster perceptions of incompetence. All of which can negatively impact on motivation and can lead to discontinuation of behaviour. To explain this in the context of health behaviours we can take the example of smoking whilst pregnant. A woman who sees a stop smoking campaign telling her to give up, but has no will to stop would be classed as being amotivated. However, if her family and friends voiced their concern about her health and that of her developing baby and their wish for her to stop smoking, she may then move to being classed as being externally motivated, her motivation is coming from external pressures.. If smoking made her feel embarrassed about the way she could be viewed as being seen as selfish putting her desire to smoke before the needs of her unborn baby she would be classed as having introjected motivation, however if she felt that quitting was something she had been contemplating for some time because she too was concerned about her health and the health of her developing baby and she feels confident in her ability to successfully quit she may be classed as having integrated regulation. Conversely, if she had several unsuccessful attempts to give up smoking, this may serve to undermine her confidence

in her ability to quit, thus her need for competence is thwarted and as such her self-determination may be diminished i.e. the failures may serve to demotivate her to engage in smoking cessation. So it can be seen with the right environment an individual can move from having minimal motivation to an increasing motivation to change behaviour or alternatively if any of the fundamental needs are not met their motivation can decrease.

Self-determination theory has provided a clear framework for enhancing and maintaining motivation through the support of the three core psychological needs; competence, relatedness and autonomy. SDT was derived from the early laboratory work exploring motivation and the effects of reward conducted by Deci & Ryan. However since then, there has been an increasing body of experimental research that has been influenced by SDT which has moved away from the laboratory into 'real-world' settings. And this can be seen in the field of health where a number of studies have been conducted comparing an intervention based on SDT with a control group (Silva et al., 2008, Chatzisarantis and Hagger, 2009, Williams et al., 2006). The findings from these studies support the notion that environments that meet the psychological needs of autonomy, competence and relatedness facilitate the enhancement and maintenance of motivation resulting in improved treatment outcomes (Ryan et al., 2008). And it has been suggested that these control studies provide confirmation of the external validity of SDT when applied to 'real-world' studies as opposed to those conducted within a laboratory setting (Vansteenkiste et al., 2012).

Using theory to inform interventions is useful as it can aid researchers' understanding of not only whether an intervention is effective but also why and how an intervention works. However when the interventions studies have used SDT they have simultaneously applied all three aspects of the need-supportive components. Thus they have not explored whether any one single component is most effective or whether the efficacy is only achieved through combining all three need-supportive components. And so although the results of the early lab work leads us to believe that all three needs require fulfilment in order to permit optimum psychological health (Deci and Ryan, 2008b), and therefore enhance motivation, it is not evident whether this is true for the intervention studies.

Critics of SDT have argued that there is little evidence of the detrimental effect that reward has on intrinsic motivation. Cameron and Peirce conducted a meta-analysis of 96 between group studies which compared reward versus non-reward controls (Cameron and Pierce, 1994). Results from their study found no evidence that reward

decreased intrinsic motivation. This paper sparked fierce debate between its authors and the originators of SDT, with Deci and colleagues (2001) claiming the meta-analysis was flawed and its conclusions incorrect, they argued that their own meta-analysis (carried out in response to Cameron & Pierce's work), provided strong support for the damaging effects of reward in intrinsic motivation (Deci et al., 2001). Both parties involved in this clash remain firmly entrenched in their positions.

A further potential limitation of the Self-determination Theory is that it does not take into account the effect of mood and emotions. The theorists argue that psychological needs influence motivation however they give little consideration to the consequence of mood on motivation. For instance anger or aggression can negatively impact upon an individual's motivation and can lead to self-destructive behaviour, often referred to as 'cutting your nose off to spite your face'. It would seem that self-regulation of these negative emotions would be necessary as a means to enhance motivation.

4. 1. 4 SDT summary

As a dialectical organismic theory of personality growth and development, SDT provides a framework for the facilitation of behaviour change through the development and regulation of human motivation. Although SDT has been applied to various health behaviours it has not been utilised in maternity research. If we apply SDT's taxonomy of regulatory styles to pregnant women's motivation regarding diet and exercise we could predict that the majority of women would fall into either the introjected, identified or integrated regulatory categories. And so by utilising SDT we may be able to increase women's self-determination to eat a healthy diet and to exercise through supporting their sense of autonomy, competence and relatedness.

As was seen with the women interviewed in Study Two, many participants cited various barriers as the primary reason for not carrying out behaviour they recognised as beneficial to them and their pregnancy. A more internalised motivation that increases self-determination may enable women to overcome these barriers and facilitate the long term maintenance of health behaviours.

Next the counselling technique of Motivational Interviewing and Goal setting will be explored as it will be considered to provide the operational framework with which to apply SDT to pregnant women's behaviour change regarding diet and exercise.

4. 2. Motivational Interviewing

Motivational Interviewing (MI) is a counselling style for promoting behaviour change found to be effective and used for a number of years across the world (Miller, 1983, Baker et al., 2006, Carey et al., 1999). MI was developed from clinical practice rather than developed based on a particular theoretical model. In the past it has been criticised for not having a theoretical underpinning to explain its efficacy (Draycott and Dabbs, 1998). However in recent years it has been noted that this form of counselling can be integrated into the Self Determination Theory framework, as the principles embedded within Motivational Interviewing have clear parallels to the social-environmental factors of support for autonomy, competence and relatedness identified in SDT (see Figure 5 page 180). As such Self Determination Theory provides an insight into why and how Motivational Interviewing works (Markland et al., 2005, Vansteenkiste and Sheldon, 2006). Indeed Miller and Rollnick have welcomed the application of SDT to MI (Miller and Rollnick, 2012) (Miller and Rollnick 2012).

Motivational Interviewing is an approach developed in the early 80's by William Miller and Stephen Rollnick building on the person-centred counselling work of Carl Rogers, and also influenced by the transtheoretical model of change developed by James Prochaska and Carlo DiClemente (1982). MI as a technique to facilitate behaviour change has gained popularity worldwide with hundreds of randomised controlled trials and publications on the method are reported to be doubling every three years (Rollnick et al., 2008) MI is client-centred counselling aimed at eliciting behavioural change. Originally it was defined as a;

“Directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence” (Miller and Rollnick 2002, p.25).

Subsequently Rollnick and Miller have replaced the word 'directive' with the word 'guiding', in an attempt to remove a possible power imbalance between client and counsellor and to promote the style as being more mutually respectful (Rollnick et al., 2008). MI was developed from clinical practice in the field of substance abuse where it was found to be effective in facilitating behaviour change. Its client-centred approach reinforces personal responsibility and supports self-efficacy (Ruger et al., 2008).

MI is not a technique used “on” individuals by experts to alter behaviour, instead it is a collaborative approach between counsellor and client. MI is guided by a philosophy that has been referred to as the ‘spirit of MI’ and is described as being collaborative, evocative and honouring patient autonomy (Rollnick et al., 2008).

At its core MI relies on the cooperative relationship between counsellor and client which is non-judgemental and respectful. Often in health care, clinicians as the ‘experts’ will provide information and a rationale to patients in order to elicit behaviour change. This information giving is seen as being directive and is usually met with resistance and excuses or passivity. Frequently this type of consultation does not result in an alteration of behaviour; rather it serves to undermine potential change and can lead to labelling of the client as ‘difficult’ or ‘unwilling’ (Russel et al 2003). MI proposes that instead a collaborative approach which has an equal power balance between patient and clinician and involves joint decision making is more conducive to behaviour change

MI attempts to evoke the client’s own motivating factors for behaviour change, rather than instilling an externally driven rationale. Individual goals and values will vary from person to person and these may not correspond with the clinician’s justification for behaviour change. Miller and Rollnick argue that key to its success is the ability of the practitioner to enable the patient/client to align their own values with health behaviour change, and to internalise the arguments for change (Miller and Rollnick, 2002)

Often when one is told what to do by another, the initial reaction is to resist the command and to ‘dig one’s heels in’. MI recognises that coercion only serves to undermine our sense of autonomy and instead suggests acknowledging the individual’s right to choose whether they should act or not. Further, MI posits that the person with the greatest expertise in the behaviour and reasons for change is in fact the client. It is not within the power of the clinician to ‘make’ people change but the responsibility for change lies with the patient. It is argued that this honouring of patient autonomy leads to a more respectful relationship and is conducive to behaviour change and its maintenance.

4.2.1 Four guiding principles

The MI counselling technique is based on the following four guiding principles: ‘express empathy’, ‘develop discrepancy’, ‘roll with resistance’ and ‘support self-efficacy’ (Miller and Rollnick, 2002).

4. 2. 2 Express empathy

Pivotal to the MI technique is the principle of expressing empathy. This is not a new concept to counselling and is seen in the work of the renowned psychotherapist Carl Rogers (1980). Through the expression of empathy the client is able to see that the counsellor has an accepting rather than a judgemental approach, this is more likely to facilitate candid communication and exploration of feelings (Rogers, 1980). Miller & Rollnick (2002) are keen to clarify that an accepting approach should not be viewed as endorsing the behaviour, that it is possible to accept the behaviour whilst having a different viewpoint. It is suggested that being able to share and enter another person's way of thinking and or feeling, allows the counsellor to gain a greater insight into their behaviour and their possible reasons for change. In practice, expressing empathy is often done through the use of reflection, whereby the counsellor listens and reflects back to the client what they understood them to have said. This should not be regurgitated in parrot fashion, repeating what is said verbatim but instead, should demonstrate to the client that the counsellor not only heard them, but also they were understood.

4. 2. 3 Develop discrepancy

MI recognises that ambivalence is central to the client's motivation to change. Developing discrepancy is the technique that enables the client to talk through both the pros and the cons of maintaining the status quo, taking into account where they are and where they would like to be. Miller and Rollnick argue that through developing a discrepancy between the present behaviour and the individual's own goals or values, the reasons for change become client and not counsellor driven and results in more self-determined motivation for change. The underlying premise behind the principle is the concept that people are more easily persuaded by their own voice than being told by an external other (Miller and Rollnick, 2002).

4. 2. 4 Roll with resistance

The third principle of motivational interviewing is to roll with resistance. Resistance is a demonstration of one side of an argument for change, and it is how the counsellor responds that will influence whether the other side is voiced by the client. Resistance can come in many forms; most frequently it is displayed as outright verbal contradiction, however occasionally silence or even unenthusiastic apparent compliance can also be a form of resistance (Mason and Butler, 2010).

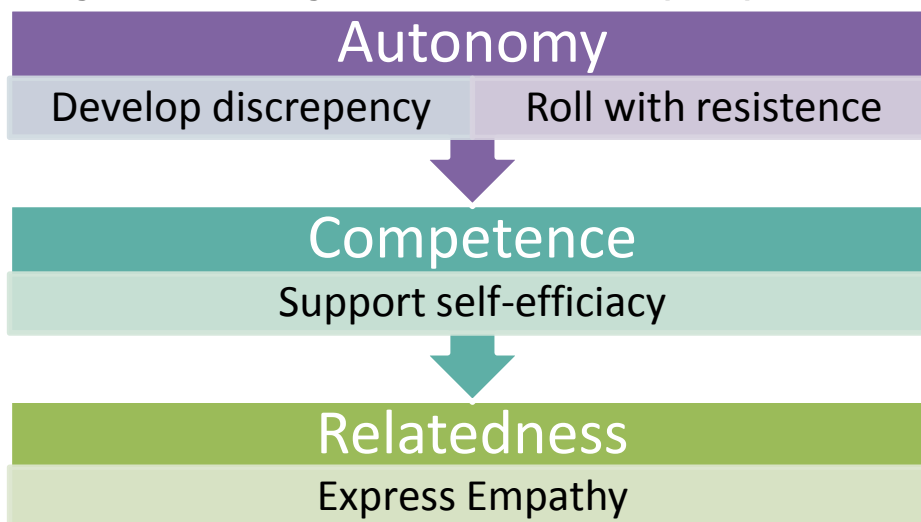
Often when health professionals or counsellors use a directive, prescriptive approach, they find themselves advocating the reasons for change whilst the client argues against it and both sides can become deeply entrenched in their position. This is clearly not an effective way to elicit behaviour change. When resistance is encountered it should not be met with opposition by the counsellor, rather the emotions around the prospect of change should be explored. Resistance to change can be the result of the counsellor's assumption that their client is more ready to change than in fact they are, and as such should be seen as the cue to change tack somewhat (Rollnick and Miller, 1995). Miller, Rollnick and Butler (2008) in their text on MI in healthcare argue that when a clinician comes strongly down on one side of the argument, it forces the client to take the opposing view. However, if this interpersonal antagonism is removed, then the argument for and against change will instead be voiced by client. The health professional can then gently guide the individual to see how their behaviour may be at odds with their own values or goals. If individuals can perceive that their way of being does not sit comfortably with their own ideals, they can have increased motivation to change. A pregnant woman for example, may have a strong desire to ensure that her growing baby gets all the nutrition it requires, therefore her consumption of a chocolate biscuit for breakfast every day may not fit with what she may identify as the ideal nutritional diet for pregnancy and therefore this is likely to increase her motivation to improve her breakfast time eating habits

4. 2. 5 Supporting self-efficacy

The final principle to the technique of MI is that of supporting self-efficacy. Without confidence in ability to change, it is unlikely that people will be able to successfully alter their behaviour even when their reasons for change are very strong, and so self-efficacy is a good predictor of successful outcome. Why would individuals even

consider change if they perceive it will end in failure? MI proposes that confidence is an important motivator and therefore a counsellor should gently instil a sense of belief that change is possible. In practice this can be achieved through drawing on previous experience, either of the client's own success in the past, or through the counsellor sharing similar clients' successes (Mason and Butler, 2010). Miller and Rollnick contend that critical to the technique's success is the counsellor's own belief in the clients ability to change (Miller and Rollnick, 2002).

Figure 5 Combining SDT constructs with MI principles



Adapted from Markland, Ryan et al. 2005.

4. 2. 6 Motivational Interviewing in health care settings

Although MI was originally developed as a technique in the field of substance misuse it has subsequently been applied successfully to various fields in health including; diet modification (Resnicow et al., 2001), exercise (Ang et al., 2007), medication adherence (Dilorio et al., 2008), smoking cessation (Glasgow et al., 2000), safer sex (Cosio et al., 2010), and diabetes management in teenagers (Channon et al., 2007).

There have been a number of systematic reviews of the efficacy of MI in effecting behaviour change in health care. Knight et al (2006) reviewed a total of 8 studies and found that the quality of the trials published was inadequate and although the authors suggested that MI shows promise as a technique to elicit behaviour change, they were

unable to recommend its use until further good quality evidence of its efficacy is produced (Knight et al., 2006). However Lundahl et al (2009) conducted a review of 4 meta-analyses and identified that MI was significantly more effective than no treatment and at least as effective as other treatments for a variety of health behaviours (Lundahl et al., 2010). The authors highlighted that a major benefit to MI is that it is equally learnable by diverse health professionals. Rubak et al (2005) reported that MI outperformed traditional advice giving and found that both psychologists and physicians were equally good at delivering effective MI. However, they noted that other health professionals such as nurses, midwives and dieticians were less effective (Rubak et al., 2005). However it is worth noting that Rubak and colleagues included only one study involving the delivery of MI by midwives, (Tappin et al., 2005), which failed to increase smoking cessation amongst pregnant women, so to determine that midwives are therefore less effective at delivering MI seems to be unfair especially as the MI delivered by midwives in the Tappin study was assessed and deemed to be of high quality. Several of the reviews noted that MI appeared to have a dose effect, in that more than one encounter improved efficacy (Rubak et al., 2005, Lundahl et al., 2010).

4.2.7 Motivational Interviewing and pregnancy

A number of studies have evaluated the efficacy of using motivational interviewing in pregnant populations. Although this has largely focused on the addictive behaviours of smoking and alcohol consumption, a few studies have also assessed its utility in improving health promoting behaviours during pregnancy.

Smoking cessation

Cigarette smoking in pregnancy is known to increase the risk of maternal and fetal pregnancy complications, cot death and can have a long-term detrimental effect on the health of offspring (DOH, 2009d). Effective methods for encouraging smoking cessation in pregnant women are therefore a health priority (NICE, 2010c). A search of the literature identified a total of seven studies which utilised motivational Interviewing as a technique to change smoking behaviour during pregnancy. Four of these took place in the USA, two in the UK and one in Turkey. In America, Stotts and colleagues have carried out two studies using Motivation interviewing. The first assessed the efficacy of a smoking cessation intervention using MI delivered by trained counsellors

(Stotts et al., 2002). This was a small study with 54 pregnant participants who were randomised to receive either the usual care or usual care plus an 8 week smoking intervention programme. The researchers collected pre and post-test measures including psychometric measures associated with behaviour change, self-reported smoking status and saliva samples to assess levels of smoking. Although the researchers found that women who received the intervention reported greater confidence in abstinence they were unable to increase abstinence rates. A later study by the same authors involving 360 pregnant smokers compared three different interventions; usual smoking cessation counselling, usual smoking cessation with feedback from ultrasound scan (USS), and Motivational interviewing with feedback from USS (Stotts et al., 2009). Results from this study indicated that none of the interventions were effective in increasing abstinence in heavy smokers. However, when it came to light smokers (≤ 10 cigarettes/day) there was more success. MI combined with USS feedback was most effective in increasing abstinence rates and the usual cessation counselling combined with USS was more effective than usual counselling alone.

Another American study carried out by Rigotti et al (2006) used telephone based smoking cessation counselling based on MI and had similar findings. Participants were randomised to receive either the novel MI intervention or the control of usual smoking cessation counselling. The result of this trial also found that the intervention was effective in those women who were considered to be light smokers, but did not outperform the usual practice amongst those women who smoked >10 cigarettes/day (Rigotti et al., 2006). Ruger et al (2008) conducted a randomised controlled trial in the USA to assess the efficacy of MI on smoking cessation of low-income pregnant women. Their study compared MI with the usual care and found that MI was ineffective at increasing abstinence rates amongst this population (Ruger et al., 2008). However a small intervention study conducted in Turkey reported an abstinence amongst its participants at 39.5% (Karatay et al., 2010). This research recruited women who reported smoking at least 1 cigarette a day, with the majority smoking between 6-10 a day. The intervention comprised 8 home visits by a community health nurse and was informed by the transtheoretical behaviour model and the authors report that the intervention utilised MI as well as the use of measuring Carbon monoxide (CO) levels in exhaled breath. They did not have a control group. The authors of this paper do not give further information about the length of the home visits nor do they discuss assessing the quality/fidelity of MI or indeed the MI training received by those nurses delivering it. The authors do describe what was covered during each of the visits but

this does not include any recognisable element of MI. It is therefore not possible to establish which elements of the intervention (the repeated visits by a nurse, the MI or the CO measuring) were effective and so the high efficacy reported may not be due to the use of MI alone.

In contrast to the study by Karatay, a large Scottish trial of MI on pregnant smokers conducted by Tappin *et al.* (2005) reported measures to ensure the fidelity and quality of MI delivered by midwives. They also provided information regarding the training received. Participants in the Scottish trial were randomised to receive either standard care or to the intervention arm where they received MI delivered by midwives in their home. The sessions last approximately 30 minutes. The authors report that although the quality of the MI delivered was high, it proved ineffective at increasing smoking cessation. More recently a pilot study also carried out in Scotland (Bryce *et al.*, 2009), found that combining MI with Nicotine Replacement Therapy (NRT) was effective at increasing smoking cessation amongst pregnant smokers with high deprivation, with 20% of smokers having quit at 3 months and 12.7% at 12 months.

It would appear that the efficacy of published intervention studies using MI to reduce smoking rates in the pregnant population is ambivalent. Some studies reported a lack or limited effect from MI (Tappin *et al.*, 2005, Stotts *et al.*, 2002) however when MI was combined with other elements such as CO/USS feedback or NRT, its efficacy improved (Stotts *et al.*, 2009, Karatay *et al.*, 2010, Bryce *et al.*, 2009). It is apparent that pregnant women who are considered to be heavy smokers are the hardest group in which to effect a change in behaviour.

Reducing alcohol consumption

The literature search identified three studies which investigated reducing alcohol consumption in pregnancy through motivational interviewing, all of which were conducted in the United States of America and demonstrated mixed results. A pilot study by Handmaker *et al.* (1999), recruited 42 pregnant women to receive either written information about risks related to alcohol consumption in pregnancy or to a one-hour motivational interview conducted by the researcher. This study found that those assigned to the intervention group showed a significant reduction in their alcohol consumption compared to the control (Handmaker *et al.*, 1999). However this is a pilot study with small numbers of participants and so although it appears encouraging, it is not possible to generalise these findings.

More recently Osterman and colleagues (2012) reported the effects of a single brief MI intervention lasting 30 minutes on reducing antenatal alcohol use on participants in the USA. Pregnant women who reported alcohol use in the previous year were recruited to the study and were randomly assigned to receive either the MI brief intervention or usual care. The MI was delivered by a research mental health nurse and the quality of the MI was assessed through the recently developed Motivational Interviewing Treatment Integrity scale (MITI) (Moyers et al., 2010). The results indicated that although the quality of the MI was deemed to be good, the intervention was not effective in reducing the alcohol consumption of participants (Osterman and Dyehouse, 2009).

A slightly larger US study called 'Project Choices' aimed to reduce the risk of alcohol exposed pregnancies (Project CHOICES Intervention Research Group., 2003) . This study investigated the effect of motivational interviewing on women of childbearing age who reported drinking moderate amounts of alcohol on a weekly basis and having unprotected or ineffective contraception. A total of 143 women who fitted the criteria participated in the study. The intervention comprised 4 manual guided motivational interviewing sessions delivered by mental health clinicians and one contraception counselling session by the family planning clinician. The results from this study identified that the intervention reduced the number of women at risk of having an alcohol exposed pregnancy (12.6% reduced drinking only, 23.1% used effective contraception and 32.9% reported both). Again limitations of this study are the small sample size and lack of a control arm.

As yet there are no published studies conducted in the UK using MI to reduce alcohol exposure during pregnancy although a randomised controlled trial conducted by Wilson and colleagues is currently underway in the North east of England, results of this are yet to be published (Wilson et al., 2012).

Limiting gestational weight gain

Finally two studies reported to use Motivational interviewing as an intervention to reduce excessive gestational weight gain in pregnancy, both of which were reviewed in CHAPTER 1 (page 29).. Firstly Claesson et al (2008) conducted a study in Sweden with obese pregnant women. The intervention comprised weekly Motivational Interviewing sessions lasting 30 minutes delivered by specially trained midwives who also provided their usual antenatal care and participants were also invited to attend a weekly water-based group exercise class. This was large study involving 348 obese pregnant women 155 of whom were randomised to receive the intervention with the

remainder assigned to the control group who received the usual care. The authors found that the women in the intervention arm of the study gained less weight and this did not negatively impact upon pregnancy, delivery or neonatal outcomes. The authors concluded that the intervention was successful in reducing excessive gestational weight gain. It should be noted that the success of the intervention may be due to the level of intensity with the intervention group receiving significantly more contact with a health professional than those in the control group.

Jackson and colleagues (2011) used a pre-recorded video doctor intervention that the authors claim was based on the principles of Motivational Interviewing. The intervention comprised three elements: the Video Doctor counselling session, Cueing sheet for the clinician and an educational worksheet for the participant. Prior to an antenatal appointment with their health provider participants took part in the video counselling session where the video doctor provided pre-recorded 'compassionate and non-judgemental counselling' based on the participants responses to a series of questions about their diet and exercise. At the end of the counselling a 'cue sheet' was printed which provided a summary of the participants risk profile and suggested counselling statements that the clinician could use when discussing diet and exercise with the individual. This intervention was a novel way of applying Motivational Interviewing as instead of using face-to-face counselling, the Video Doctor used pre-recorded responses provided by an actor, and as such seem to be out of step with the spirit of MI where the relationship between counsellor and client is key. And although participants reported high levels of satisfaction with the counselling, this does not mean that we could assume the counselling is true to the MI principles. The study recruited 287 women of any parity and across all three BMI categories (control $n=153$, index $n=134$). The results from this study found that the intervention made no difference to the number of women gaining in excess or IOM guidelines or the overall gestational weight gain of participants, and although participants reported an improvement in diet and exercise behaviour the intervention failed to limit gestational weight gain. It may be that the Video Doctor counselling failed to deliver Motivational Interviewing adequately.

4. 2. 1 **Motivational Interviewing and Goal setting**

Within MI agenda setting and goal setting are both frequently used in consultations with clients, and although at first glance they seem similar they are two different processes. Agenda setting is frequently incorporated into motivational interviewing when there are multiple behaviours that may need addressing (such as behaviours associated with obesity – i.e. diet and exercise) and is used by clinicians to facilitate decision making by the client regarding the topic of discussion (Rollnick et al., 2008). Often an Agenda Setting chart is used that provides a visual representation of the potential behaviours. The purpose of this exercise is to assist the clinician to openly acknowledge the behaviours that they are concerned about whilst encouraging the client to voice their own agenda during the discussion, thus facilitating their sense of autonomy during the counselling process (Mason and Butler 2010). Agenda setting therefore is used to guide the discussion during a counselling session.

Goal setting however is a subtly different process that is used as a tool to guide client behaviour rather than to guide the counselling session per se. Goal setting is often used in conjunction with MI, and some have suggested that in order to complement the Motivational Interviewing ethos, goal setting should be in collaboration with the client rather than a counsellor directed process (Resnicow et al., 2002). In Self Determination Theory the quality of the motivation is affected by the type of regulation that controls it and therefore goals that have originated from within the individual would be seen as more autonomy supportive than those that have originated from an external other. We can deduce then that a collaborative approach would be favoured as this would be a more autonomy supportive stance. Studies exploring the effect of goal type on behaviour have demonstrated that extrinsically orientated goals negatively impact on goal attainment when compared with goals that are more intrinsically orientated (Deci & Ryan 2000). As was seen in Chapter one, two of the intervention studies that sought to reduce gestational weight gain through behaviour change used both goal setting and motivational interviewing in combination. However the weight gain goals that were set were assigned by the clinicians using the IOM recommendations based on BMI stratification, and therefore the goals were not set by the participants. This suggests that the goal setting in these studies failed to be delivered in accordance with the client-centred MI approach as suggested by Resnicow and colleagues (2002) and would not be supported within Self Determination Theory.

Locke and Latham have been seen as being pioneers in Goal Setting theory and research. Their work, predominantly in the field of organisational psychology, developed and honed goal setting theory over four decades (Locke and Latham, 2002). The theory is founded on the premise that purposeful goal setting positively affects behaviour. Their research demonstrated that goals that are *specific, proximal* and are *challenging* yet attainable result in improved performance when compared to no goals or simple goals, and the inclusion of feedback and reward in goal setting have been found to increase motivation and further improve performance (Shilts et al., 2004). Interestingly a review of goal setting carried out by Locke and Latham concluded that goal attainment was not influenced by who had set the goals; whether goals were assigned to individuals or were developed in collaboration with them did not predict their success (Locke and Latham 2002). However there is increasing body of evidence that suggest that in the field of health, a self-determined collaborative approach to goal setting is more successful in changing behaviour than goals that were assigned to individuals (Hall et al., 2011, Estabrooks et al., 2005).

Goal attainment is closely linked with self efficacy; not only has self-efficacy been found to predict goal achievement (Bandura 1977a), but goal attainment in itself can increase an individual's sense of self efficacy, conversely failure to achieve goals lowers self-efficacy (Philips and Gully, 1997, Mason and Butler, 2010). Therefore in order for behaviour change to succeed, not only is it important for that individual to feel they are capable of achieving their goal, the goal must also be attainable, as setting a goal that is so difficult that it leads to failure will only serve to undermine confidence in ability. It would seem that it is important to achieve the right balance between setting goals that are challenging enough whilst still remaining achievable.

Locke and Latham's theory has been applied outside of organisational psychology to the field of health psychology where behaviours that have been targeted using goal setting include diet, exercise, smoking, alcohol misuse and chronic conditions management (Pearson, 2012)

Researchers examining the efficacy of goal setting have found it to be effective in promoting physical activity and dietary behaviour change in adult populations (Shilts et al., 2004) and more recently a systematic review by Brown et al (2012) concluded that goal setting appeared to be useful in the weight management of a pregnant population.

4.2.2 Conclusion

The evidence suggests that Motivational Interviewing has potential to be an effective intervention to elicit behaviour change across a variety of health domains most notably in the field of addictive behaviours. However the literature around its use as an intervention with the pregnant population is less clear. There is some evidence to suggest that MI in this population has been found to be slightly more effective when combined with other behaviour change techniques (Claesson et al., 2007, Project CHOICES Intervention Research Group., 2003, Bryce et al., 2009). However the number of studies is limited, with minimal research being conducted within the UK. It is evident that further, research is needed to assess the efficacy of Motivational Interviewing as an intervention to elicit behaviour change with the pregnant population.

Motivational Interviewing has been identified as an autonomy supportive way to communicate with individuals facilitating behaviour change (Miller and Rollnick, 2002), and research suggests it is a popular technique with those who use it and those individuals who have received it (Cronk et al., 2012, Wiley et al., 2012). As a communication technique its strength lies in its person centred approach and importantly its brevity. For this reason it was identified as an appropriate method to use alongside goal setting to form the basis for midwife-led intervention.

Goal setting is frequently used as an adjunct to MI as a means to guide the future behaviour of individuals. Although there has been some debate surrounding the method of determining goal setting, an MI approach that is influenced by Self-determination theory would support a collaborative method between counsellor and client where individuals are supported to identify their own behavioural goals.

Since piloting Study Three, in a strategy document concerning the maternity service provision in Wales, Motivational Interviewing training was identified by the Welsh Government as key to the enhancement of the role of the midwife in health promotion (Welsh Government, 2011b). This has resulted in the funding of a pilot programme to provide MI training to groups of midwives from each of the Local Health Boards across Wales. It therefore seems that using MI as part of this intervention study is especially relevant. The following chapter will set out the intervention study.

CHAPTER 5.

STUDY THREE: INTERVENTION STUDY

Introduction

As identified in the two preliminary studies, both Antenatal Clinic Managers and women view pregnancy as a key time to improve and maintain health behaviours, and see the role of the midwife as key in facilitating this. However barriers to facilitate this behaviour change were identified by both Managers and the women. Self Determination Theory provides a framework for improving the quality of motivation through supporting the meeting of the three fundamental psychological needs; autonomy, competence and relatedness. The theory suggests that if these needs are met, motivation is improved, behaviour is more self-determined and thus maintenance of behaviour change is more likely. With this in mind the intervention was designed to facilitate women to make healthy lifestyle choices with regards to diet and exercise. Due to the current resource constraints within NHS maternity services, it was identified that any intervention should utilize existing mechanisms and services without placing undue burden on an already stretched workforce (Warwick, 2012) . The intervention was therefore designed to be a brief midwife-led programme, with an emphasis on supporting women to make autonomous decisions, whilst understanding their views of what a healthy lifestyle in pregnancy means to them.

This final study explores the feasibility and acceptability of a midwife-led intervention that aims to improve the diet and activity behaviours of pregnant women. Therefore the focus of this study was on improving lifestyle behaviours rather than on weight gain. Health behaviours are not just an issue for overweight and obese women and as noted in chapter one there is evidence that many pregnant women have difficulty in maintaining a healthy lifestyle. Specifically, research has shown many fail to consume adequate amount of fruit and vegetables, and do not limit their intake of energy dense foods (Crozier et al., 2009b, Inskip et al., 2009, Verbeke and De Bourdeaudhuij, 2006). The majority of pregnant women are also unable to achieve the recommended amount of exercise/physical activity through the course of their pregnancy (Symons Downs and Hausenblas, 2004, Clarke and Gross, 2004) and even those women who were regular exercisers before pregnancy are unable to maintain these behaviours whilst pregnant (Duncombe et al., 2009). With this in mind it was decided that the intervention would

be delivered to pregnant women with a BMI between 18-29 (both healthy and overweight categories). Those women with a BMI > 30 were deemed to require consultant led care as per the clinical guidelines (CMACE & RCOG 2010); as they were not in receipt of midwife-led care they were excluded from this study.

5.1.1 Aims

This study aims to evaluate the feasibility and acceptability of an intervention programme called 'Eat Well Keep Active' designed to elicit healthy behaviours regarding eating and physical activity during pregnancy. Objectives of the study are threefold:

1. To conduct a small exploratory study of an intervention programme using motivational interviewing and goal setting entitled 'Eat Well Keep Active'.
2. To explore the feasibility and acceptability of the intervention.
3. To collect some preliminary qualitative data of the efficacy of the intervention at improving women's diet and exercise behaviours.

This chapter will firstly provide a detailed description of the 'Eat Well Keep active' intervention programme followed by the methods used for the study, analysis, results and finally the discussion of findings.

5.2. Description of the 'Eat Well Keep Active' (EWKA) intervention

The EWKA programme is an intervention based upon the Self Determination Theory framework for enhancing and maintaining motivation. The development of this programme was influenced by the findings from the preliminary studies and was designed by me with support from my Academic Supervisors. It was felt that an intervention programme that provided an opportunity for an individual to discuss with a midwife their lifestyle behaviours and explore ways in which they could be facilitated to make improvements was needed. This intervention was designed to focus on what they could do to improve their health behaviours without placing an overemphasis on

'risk'. This intervention was delivered relatively early on in pregnancy and comprised three stages:

Stage 1 The programme commenced with a brief one to one guiding session delivered by the researcher after a woman has booked for maternity care at approximately 16 weeks gestation. The session utilised Motivational Interviewing and goal setting to identify specific dietary and physical activity goals that the women would like to achieve. As already outlined in CHAPTER 4 (page177), Motivational Interviewing is a client-centred counselling technique designed to elicit behaviour change through the exploration and resolution of ambivalence. This client-centred approach reinforces personal responsibility and supports self-efficacy (Ruger et al., 2008). This approach is 'woman centred' and as such, sits comfortably with the midwifery ethos of giving maternity care that prioritises the needs and wishes of the individual recognising them to be equal partners in the delivery of care (Royal College of Midwives, 2008).

It is usual for health professionals to give health messages in a directive approach i.e. telling clients what behaviours they should and shouldn't do and why. Rollnick *et al.*, (2008) state that this leads individuals to defend their current behaviour and in doing so can thwart behaviour change. Literature around behaviour change demonstrates how a more autonomy supportive approach may be more effective.

"People are usually more convinced by reasons they discovered themselves than by those found by others" (Blaise Pascal cited in (Rollnick et al., 2008) p12)

The guiding session was based on the four guiding principles and spirit of MI (Miller and Rollnick, 2002).

Initially women were asked an open question: how did they feel about their current diet and their activity levels? The idea behind this question was to explore how they perceived their behaviours and provided a starting point to understand their views. It also helped to identify if they demonstrated ambivalence. For example an individual may have said: "I am eating loads more fruit and veg to be healthy for my baby but I do have a sweet tooth" or "I try and stay active but I should do more I suppose I'm just so tired" Both these sentences show the ambivalence felt about the behaviours but also includes 'change talk', i.e. signifying a willingness to change their behaviour.

Summarising and reflecting back to the woman her 'ambivalence' and 'change talk' facilitated further exploration of her feelings about that behaviour (Rollnick et al., 2008, Mason and Butler, 2010), enabling her to recognise that a will to change was coming

from within her and not directed from an external other. This was therefore autonomy supportive and acted as an agent for change.

Women were also encouraged to talk about what they understood to be the current recommendations on lifestyle behaviours during pregnancy and this gave them the opportunity to ask for more information if they did not know. This is the key to Motivational Interviewing as when a health professional gives unsolicited information and advice, it can come across to the person receiving it as 'preaching' and can be met with resistance or passivity and does not facilitate change. Within MI, permission from the client must be given prior to imparting information (Rollnick et al., 2008), and this seeking permission demonstrates to the individual that their autonomy is honoured and that their wishes are respected.

Towards the end of the MI session a proforma goal setting chart was completed with the woman to identify appropriate goals and facilitate the development of a personalised goal card. The chart was adapted from similar tools used in behaviour change for diabetics (Mason and Butler, 2010, Stotts et al., 2009). The chart itself comprised a number of illustrations representing areas of eating and physical activity behaviours as well as some empty spaces, a copy of the chart can be found in the appendices (

Appendix 13). The chart was used as a prompt to assist individuals to identify areas of their everyday behaviours that they might like to change. Blank spaces were included in the chart s there may have been other issues of their lifestyle behaviours that an individual believes to be more important than those around diet and activity, this therefore gave them the opportunity of setting their own agenda whilst giving them ownership of the goals. Again this provided an environment that supported their autonomy. The chart was usually introduced during the session by saying “On this chart are a number of areas of everyday life that some people may think they need to address to stay as healthy as possible during pregnancy. How do you feel about these and are their changes you would like to make?” The chart therefore acted as a prompt and a guide to focus the session on identifying goals that were pertinent to the individual.

The guiding sessions tended to last between 15-30 minutes, however, the majority of this time was spent establishing a rapport with the woman, and putting her at ease as this was the first meeting. Within clinical practice the guiding and goal setting session could easily be achieved in 8-10 minutes, as part of the larger booking appointment¹⁷ with the midwife.

Stage 2 The second aspect of the EWKA programme was the personalised goal card that was developed following the goal setting exercise and sent out to participants within one week of the first meeting. Goal setting as a strategy for behaviour change has been used widely across many disciplines including health, and research indicates that it can be an effective tool (Ammerman et al., 2002, Webber Cullen et al., 2001). Indeed the systematic review of interventions by Brown et al (2012) which specifically looked at goal setting strategies used by researchers to limit excessive gestational weight gain found goal setting to be a useful component. The card detailed the individual goals identified during the initial session, as well as identifying barriers to achieving those goals and means of overcoming them as identified by the women during the counselling session. The goal card supported the MI and provided participants with a personalised individual record of the session that could be referred back to. Because the goals were specific to the individual each goal card was unique. An example goal card can be found in the appendices (Appendix 14). The cards were printed on green coloured card, of A6 size (148 x 105 mm), had the name of the woman at the top and had the goals they had identified printed on them (typically

¹⁷ Booking appointment – This is usually the first meeting a pregnant woman has with her midwife when she is booked for maternity care. This appointment is used to give information and obtain detailed medical and obstetric history in order to establish the appropriate maternity care pathway.

between 4-6 goals). For accessibility and convenience they also had a magnetic backing so that the cards could be placed onto the fridge (or other suitable surface).

Stage 3. The third and final aspect of the EWKA programme was a follow-up telephone call two weeks after the first session. The aim of the call was to offer support and encouragement, assess the goal setting and to identify any unforeseen barriers that may have impeded achievement of goals. Utilising MI it was possible to facilitate the development of skills to overcome those barriers where viable. It also provided the opportunity for women to give feedback on their achievements and this was used to provide an environment to support their confidence and competence in continuing to achieve their goals. This follow-up call lasted approximately 5 minutes and despite its brevity was a key aspect of the intervention programme as this demonstrated to individuals that the goals that they had identified as important to them were also of importance to me and therefore that their views were valued. This follow-up call along with the guiding session and goal setting was designed to enhance women's motivation through providing an environment that supported them to satisfy the three fundamental psychological needs as set out by SDT; autonomy, competence and relatedness.

MOTIVATIONAL INTERVIEWING TRAINING:

For the purpose of this study, I attended a three day residential training course for health professionals on Motivational Interviewing. This course was delivered by an accredited member of the MI Network of Trainers (MINT). It is understood that full competency in the use of MI is achieved when training is supported by supervised practice (Miller et al 2005). In recent years a Motivational Interviewing Treatment Integrity (MITI) code has been developed to measure treatment fidelity of MI (Moyers et al., 2010) which requires an external coder with expertise in MI. However, due to the limited funds available for this research, it was not possible to enlist the assistance of a MINT trainer for supervision or integrity coding. Instead, personal reflection was consistently used throughout the guiding sessions to ensure the principles of MI were adhered to at all times. It was possible to continually monitor the degree to which this was achieved as built into the technique is the principle of 'Rolling with Resistance', and proponents of MI argue that when a client demonstrates 'resistance' this is the cue for the counsellor to change tack to a less directive and more reflective position (Mason and Butler, 2010) This makes sure that counselling sessions stay within the 'spirit of MI' i.e. that they are collaborative in nature and not antagonistic.

5.3. Methods

5.3.1 Sample & recruitment

This mixed methods study investigating the feasibility and acceptability of the EWKA intervention recruited a total of 20 pregnant women from a large hospital in South West Wales. The number of participants was chosen to provide adequate data relating to the acceptability of the intervention whilst remaining manageable for a single researcher. Participant criteria for recruitment to the study are listed in table 10.

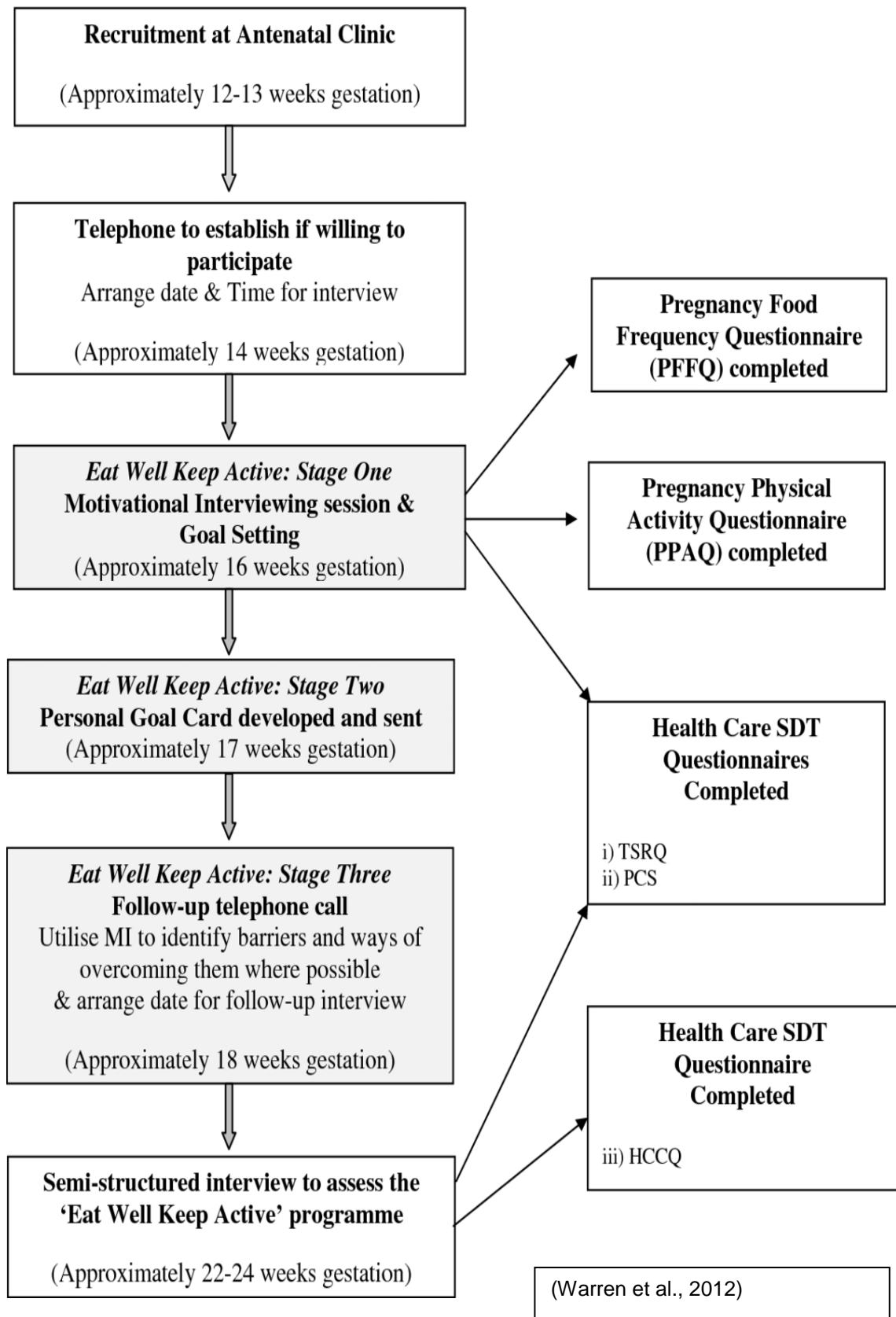
Table 10 Study 3 inclusion and exclusion criteria

| Inclusion criteria | Exclusion criteria |
|---|--|
| Gestation less than 15 weeks at recruitment | Lack of fluency in English |
| BMI between 18 and 30 | History of early pregnancy complications (e.g. threatened miscarriage) |
| Suitable for Midwifery led care | History/diagnosis of eating disorders |

By only including women who were assigned to midwifery led care, participants would have no identified underlying health conditions or complications that may have made them unsuitable for inclusion in the study. These women were therefore considered to be healthy, low risk pregnant women. The intervention was designed to facilitate participants to make healthy decisions regarding their dietary and physical activity behaviours in line with the current recommendation for all pregnant women. Therefore BMI categories ranging from 18 – 30 were included within this study, providing there was no history/diagnosis of an eating disorder.

Potential participants were identified and approached by the antenatal clinic midwife, when attending clinic for their dating scan. Prospective participants were provided with the participant information sheet (PIS) (Appendix 15) which was discussed with them in detail allowing the opportunity to ask questions. If willing to consider participation, women were then asked to provide contact details. Approximately a week after potential participants were first approached, I contacted them via telephone to establish whether they were still happy to participate and if so a mutually convenient day and time was made for the initial guiding session. The period of a week was chosen to give women ample time to fully consider the implications of participation in the study and enabled them to discuss this with their partner if they chose to do so.

Figure 6 EWKA Study Procedure Flowchart



5.3.2 Outcomes

The primary outcome measure was women's views on the acceptability and efficacy of the 'Eat Well Keep Active' programme. This was obtained through one-to-one interviews 6–8 weeks following the delivery of the first guiding session. Secondary outcome measures included comparisons of the assessment of the Self Determination Theory constructs associated with behaviour prior to and following the delivery of the intervention, as well as preliminary data about self-reported eating and physical activity behaviours.

The Medical Research Council framework for developing and evaluating complex interventions provides guidance to researchers, a key preliminary element to this is assessing the feasibility and piloting methods (MRC, 2008) and thus this study conforms to phase 2 of the framework.

5.3.3 Data collection

Data was collected from participants at two time points (see procedure flow chart page 197). Firstly participants were sent a survey in the post and asked to hand the completed survey to the researcher before the start of the guiding session. The survey comprised three validated questionnaires; the Pregnancy Food Frequency Questionnaire (PFFQ) (Rogers and Emmett, 1998), the Pregnancy Physical Activity Questionnaire (PPAQ) (Chasen-Taber et al., 2004), as well as the Health Care Self Determination Theory package (HC-SDT) (Williams et al., 2000) which included the Treatment Self-Regulation Questionnaire (TSRQ) and the Perceived Competency Scale (PCS). Originally the questionnaire was going to be completed immediately prior to the start of the guiding session, however, as the questionnaire was not intended to be part of the intervention it was agreed with the participants to send the questionnaire in the post for them to complete at a convenient time and return before the start of the initial session. All participants consented to this change in the protocol. A copy of the entire survey can be found in the appendices (Appendix 16). The second time point for data collection was between 6-8 weeks after delivery of the start of the intervention programme, when participants were again sent another survey in the post and were asked to complete it. This survey comprised the Health care SDT (HC-SDT) package which at this time point included the Health Care Climate Questionnaire (HCCQ) (Williams et al., 2000). Participants were asked to complete the survey prior to the next

meeting with the researcher. They were also asked to take part in a one to one semi-structured interview to assess the acceptability and perceived efficacy of the intervention. The interview was digitally recorded to allow for transcription and analysis

5.3.3.1 Women's views on 'Eat Well Keep Active'

The primary purpose of the study was to assess whether women found the midwife-led EWKA intervention programme acceptable. Semi-structured interviews were used to evaluate the acceptability and participant perception of efficacy of the intervention. An interview schedule (Appendix 17) was used to ensure the interview remained focused but the decision to use semi-structured interviews provided the opportunity for further exploration and thus provided richer data. The purpose of the interview is to gain an in-depth understanding of women's experiences of the intervention, including whether and why they found it helpful or not.

5.3.3.2 Pregnancy Food Frequency Questionnaire (PFFQ)

The PFFQ was developed for the Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC) for the purpose of analysing the dietary intakes of 11,923 pregnant women (Rogers and Emmett, 1998). Subsequent studies using the PFFQ have found it to be a useful and reliable tool in the collection of dietary data of pregnant women (Mouratidou et al., 2006). This questionnaire was adapted and revised as questions relating to consumption of food/drinks which are now contraindicated in pregnancy (e.g. alcohol, shellfish, liver) were removed from the questionnaire. Also questions pertaining to body image were removed, as this was not felt to be relevant to the current study. The version of the questionnaire used contained 95 items asking respondents to identify how frequently foods were consumed during the four weeks prior to the administration. The first 40 items relate to the frequency of consumption of various forms of meat, fish, dairy, carbohydrates, fruit and vegetables, confectionary as well as processed foods. The options for frequency comprised: never or rarely, once in 2 weeks, 1-3 times a week, 4-7 times a week and more than once a day. The questionnaire does not specify the size of a portion and so it is assumed that portions are of a standard size. More detailed questions relating to the consumption of breads, fat, milk and drinks were also asked. The final seven questions relate to eating

behaviour designed to elicit whether participants have been on calorie restricted diets, and whether they were currently or have a history of being either vegetarian or vegan.

5.3.3.3 Pregnancy Physical Activity Questionnaire (PPAQ)

The PPAQ developed by Chasen-Taber and colleagues in America is a self-report instrument comprising 34 items for measuring the time spent participating in activities including household chores, work related activity, sport and exercise as well as transport and sedentary behaviours (Chasen-Taber et al., 2004). Individuals are asked to select the category which best describes the amount of time spent in 32 activities. The end of the PPAQ has two open-ended items which allows the participant to add activities not already listed.

The PPAQ has been assessed as being a valid and reliable measure of exercise and activity in pregnancy (Chasen-Taber et al., 2004, Foxcroft et al., 2011). The PPAQ was modified for this study as the original questionnaire repeatedly asks respondents about their activity levels 'During this trimester'. The word trimester was felt to be medical terminology that some may not have understood. Instead the questions were altered to: 'During the last 4 weeks'.

The PFFQ and PPAQ were used in order to obtain preliminary data about the self-reported dietary and physical activity behaviours of participants.

5.3.3.4 Health Care Self Determination Theory pack (HC-SDT)

The HC-SDT is a package combining three brief questionnaires (Williams et al., 2000). All three questionnaires comprise a series of statements and respondents are asked to indicate the extent to which each is true to them using a seven point Likert scale ranging from 1 (*not at all true*) through 4 (*somewhat true*) to 7 (*very true*). The first scale is the Treatment Self-Regulation Questionnaire (TSRQ) a 15 item measure which is used to assess an individual's motivation in terms of their degree of autonomy and self-regulation. It comprises 3 subscales: autonomous (6 items) controlled (6 items) and amotivation (3 items). Two versions of the TSRQ were included within the pack one to assess dietary behaviours and one physical activity behaviours. The second questionnaire is the Perceived Competence Scale (PCS), an 8-item measure which is

used evaluate individuals' confidence to maintain healthy behaviour (4 items relate to diet and 4 items for exercise). The third and final questionnaire is the Health Care Climate Questionnaire (HCCQ), a 12-item measure used to assess respondents' perception of the degree to which they found their health-care provider autonomy supportive or controlling. This final questionnaire included in the HC-SDT pack was used at the final evaluation meeting only, to assess the participants' perception of how autonomy supportive or controlling they had found the delivery of the 'Eat Well Keep Active' intervention programme. The HC-SDT has been assessed as valid and has been widely used in the study of health behaviours (Foxcroft et al., 2011, Levesque et al., 2007).

5.3.4 Ethical considerations

As with study two, because this study involved recruitment within an NHS setting, ethical approval was sought from the Local Research Ethics Committee. The electronic Integrated Research Application System (IRAS) was used to apply for permissions from both the LREC and R&D within the Health Board. Following a minor addition to the participant information sheet and consent form (see Appendix 15 & Appendix 18) this piece of research was given a favourable ethical opinion and as such was supported by R&D (LREC reference: 09/WA/0018 – see

Appendix 19).

5.3.5 Gaining access

Following a favourable opinion from LREC and R&D, the head of midwifery at the health board was contacted and her permission was gained for the involvement of antenatal clinic midwives in aiding recruitment for the study. A meeting was then arranged with the Antenatal Clinic Managers in order to provide further information about the study and details regarding criteria for recruitment. This provided them with the opportunity to ask further questions and to co-opt other clinic midwives to assist with recruitment.

As with Study 2, all midwives were given a copy of the inclusion/exclusion criteria. Potential participants were identified by clinic midwives from the maternity notes which are checked through as part of the booking process. Once identified the women were briefly informed about the study by the midwife and given the participant information sheet to read. If willing to consider participation in the study, their contact details were obtained and held in a sealed envelope in the secure clinic office. Only clinic staff had access to this office. One week later I telephoned the women to answer questions and to establish if they were still willing to take part.

Recruitment for the study was initially slow, when I asked the Managers sensitively why the numbers were low it became apparent that the clinic was exceptionally busy and this resulted in them feeling overstretched. It appeared that being involved in the recruitment process for this study, unintentionally added to the midwives workload. I therefore offered assistance with some of the administration required (filing blood results, answering the telephone and dealing with queries etc.). I was fortunate that as a registered midwife who has experience of working in the busy antenatal clinic I knew what I could do to help. The Managers and midwives were grateful for my assistance and my presence acted as a gentle reminder to recruiting midwives. This meant that when the midwives identified possible participants and gave them the details about the research, I was available to answer any queries and go through the participant information sheet with women. Although this may be seen as a deviation from the agreed protocol, the guidance from the National Patients Safety Agency regarding participant information sheets clearly states that simply providing the information sheets and then returning to answer questions is not as effective as having a discussion to ensure consent is obtained (NRES 2011). Thus the change enhanced the

quality of the participant information and consent process. Within a matter of weeks all participants were recruited.

5.3.6 Methods of analysis

QUANTITATIVE ANALYSIS:

The quantitative data gathered from the self-report questionnaires was entered in SPSS to allow for analysis. The PFFQ responses were then categorised into food groups as per the Eatwell plate (i.e. Complex carbohydrates, fruit & vegetables, milk & dairy, meat & protein and foods high in fat/sugar) (NHS Choices., 2011) and frequency distributions calculated to provide preliminary data on dietary intake as well as dietary behaviours.

For the PPAQ, weekly reported time spent at each activity was multiplied by its intensity in order to obtain a measure of the total average reported weekly expenditure (MET-h°week-1). An intensity value of 1 MET is the metabolic equivalent to the energy expenditure required when the body is at rest for 1 hour. To provide an illustration we could look at an example of daily energy expenditure: if someone was to be at rest for 24 hours their daily energy expenditure would be 24 MET-h°day, by comparison, someone who spent a 24 hour period walking their dog, their daily energy expenditure would be 72 MET-h°day (walking dog =MET value of 3). When devising the PPAQ, Chasan-Taber *et al.*, (2004) used the Compendium of physical activities (Ainsworth *et al.*, 2000) to assign each activity a MET intensity value. The MET values for the responses given for the two open questions in the PPAQ were acquired through the most recent web edition of the Compendium of Physical Activities (Ainsworth *et al.*, 2011). The MET-h°week-1 for each level of intensity (sedentary, light-intensity, moderate intensity and vigorous intensity) was calculated and all activities were further categorised into each of the four domains (household/caregiving, occupational, transport and sports/exercise). The means and variations (SD) for each category were calculated to provide insight into the intensity and domains of energy expenditure.

There is some debate about the way in which Likert scales should be analysed. It has been argued that Likert scales can on occasion be considered to meet criteria for parametric testing, and several researchers have treated them as such (Norman, 2010). However, many have argued against this as although the response categories contained within a Likert scale have a rank order, they are not considered to be interval data, but rather ordinal data, and as such do not meet the criteria for parametric testing

(Jamieson, 2004). This viewpoint coupled with the limited sample size has led me to treat the data as non-parametric.

The HC-SDT pack had three separate questionnaires: Treatment Self-Regulation Questionnaire, (TSRQ), Perceived Competence Scale (PCS) and Health Care Climate Questionnaire (HCCQ). Mean scores of each of the subscales within the TRSQ was obtained to provide a singular score for: autonomous motivation, controlled motivation and amotivated forms of behaviour for both dietary and physical activity. Means were also calculated for PCS scores as well as for the health care climate scores.

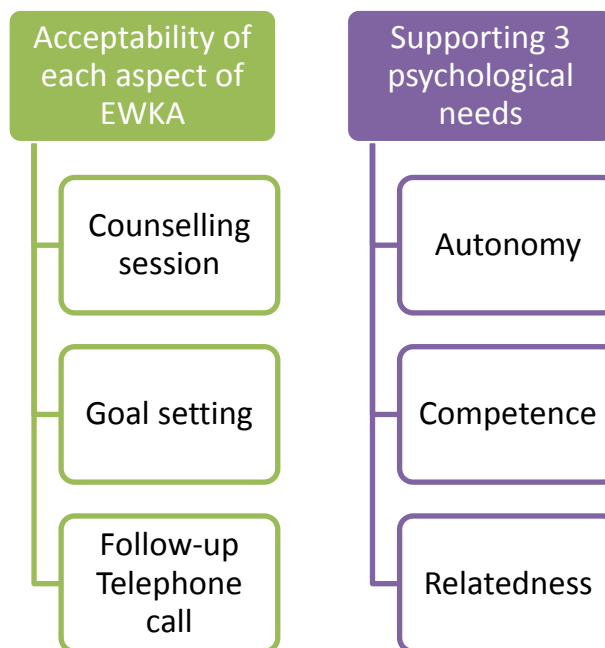
QUALITATIVE ANALYSIS:

As with studies one and two, the recorded interviews were transcribed word for word and then imported into NVivo 8 for analyses. The factual coding of data captured participant characteristics such as age, parity and BMI category. Unlike the two previous studies, as this intervention study was informed by Self Determination Theory, theoretical thematic analysis was used.

Braun & Clarke (2008) suggest that although an inductive approach to qualitative data analysis is more common, there are some instances when a deductive or theoretical approach is more suitable:

“Theoretical’ thematic analysis would tend to be driven by the researcher’s theoretical or analytic interest in the area, and is thus more explicitly analyst driven”. (Braun and Clarke, 2006) p84).

Figure 7 Analytical Framework for Study 3



This study was developed to explore the acceptability of a midwife-led intervention designed to facilitate healthy lifestyle behaviours during pregnancy. As the intervention was informed by Self Determination Theory, it was hypothesised that if the ‘Eat Well Keep Active programme’ successfully supported the three psychological needs this would increase an individual’s self determination to eat a healthy balanced diet and maintain physical activity. The first stage of the analysis was concerned with the acceptability of the programme and each aspect of the intervention; the counselling session, the goal setting and the follow-up telephone call. The next stage of analysis assessed whether the intervention programme supported the three psychological needs as set out by Self Determination Theory and thus the transcripts were scrutinised to identify instances where participants reported whether the programme supported their sense of autonomy, competence and relatedness. The qualitative analysis therefore not only provided an insight into how the participants viewed their experience of the ‘Eat Well Keep Active’ intervention programme, but also whether the programme was able to meet the psychological needs as identified by SDT. The following section presents the results of the intervention study and discusses the findings in relation to the literature.

5. 4. Results

5. 4. 1 Participant characteristics

A total of twenty women were successfully recruited to the study, all but one of whom remained in the study until follow-up at 6 weeks post intervention. The reason one participant withdrew from the study is unknown. All the participants were Caucasian and spoke English as their first language. The majority were pregnant with their first baby, considered to be of healthy weight and were in employment (see Table 11). At recruitment all participants were classed as suitable for midwife led care as this was a prerequisite for inclusion within the study and therefore they were identified as having healthy, low risk pregnancies. All the participants who remained in the study completed questionnaires from both time-points.

Table 11 Study 3 participant characteristics

| | | <i>n (%)</i> |
|---------------|----------------|--------------|
| Age: | 18-24 | 7 (35) |
| | 25-29 | 3 (15) |
| | 30-34 | 8 (40) |
| | 35+ | 2 (10) |
| Employment: | Professional | 7 (35) |
| | Clerical | 5 (25) |
| | Unskilled | 6 (30) |
| | Unemployed | 2 (10) |
| Parity: | Primiparous | 14 (70) |
| | Para 1 | 5 (25) |
| | Para 3 | 1 (5) |
| BMI category: | Healthy weight | 14 (70) |
| | Overweight | 6 (30) |
| | Obese | 0 |

Baseline data (at approx 16 weeks gestation) of the dietary and physical activity behaviours of participants was captured via the PFFQ and PPAQ and provides an insight into the food intake and levels of physical activity of the sample in the four weeks prior to recruitment.)

5.4.2 Food intake

Typically the Pregnancy Food Frequency Questionnaire has been used by dietitians to assess the nutrient intake of pregnant women. However, this research used the PFFQ to gather data on the consumption of food from the five main food groups identified within the Eatwell plate, namely: complex carbohydrates, fruit and vegetables, dairy, meat and protein and foods high in fat and/or refined sugars (NHS Choices., 2011). This study aimed to capture data regarding the overall diet quality of participants and therefore linked with the advice for pregnant women, rather than the more specific nutrient intake. Frequency tables can be found in the appendices (Appendix 20), where items have been categorised into the five food groups.

Participants ate a combination of complex carbohydrates the most popular of which tended to be bread followed by potatoes in one form or another, pasta and then rice. The majority of participants ate bread on a daily basis ($n=19$) more of whom reported choosing to eat wholemeal bread ($n=13$) over white bread ($n=11$) and this may show an inclination towards opting for healthier whole grain versions as per the advice contained within the Pregnancy Book, (DOH, 2007). Participants were asked about how frequently they ate potato in three different forms: roast, boiled/mashed and chips. Boiled/mashed potato was most popular with 16 participants reporting that they ate them at least once a week and the remaining 4 consuming them fortnightly. Although chips and roast potatoes are complex carbohydrates they are also considered to be high in fat when comparing them to boiled or mashed potato (assuming large amounts of fat is not added to the latter), intake of these should therefore be limited. The consumption of chips was relatively high with 10 participants reporting they ate them on a weekly basis and 7 on a fortnightly basis but roast potatoes were less frequently consumed (weekly $n=3$, fortnightly $n=10$). The data for cereal consumption, as with the bread, showed that the majority of participants reported choosing to eat wholegrain or bran most frequently ($n=14$).

Peas/sweetcorn/broad beans and carrots were fairly popular vegetables with the majority of participants consuming them at least weekly ($n= 13$, $n=12$ respectively). Other root vegetables (swede, turnip, parsnips etc.) were less commonly eaten on a weekly basis ($n= 7$). Interestingly a significant minority reported that they never or rarely ate other green vegetables (such as green beans, runner beans, leeks etc.) ($n = 6$) or green leafy vegetables ($n = 6$), both of which are encouraged during pregnancy as they are rich in iron. The most popular vegetable item listed was salad, with the majority of participants consuming it at least weekly ($n= 15$), or fortnightly ($n= 4$). The

trend away from leafy and root vegetables towards salad may be due to the time of year that participants were recruited (late spring and early summer months), as these vegetables are considered to be seasonal. Also the items relating to the vegetable intake of participants had a limited number of listed vegetables; notable exceptions to the list were those from the allium species (e.g. onion, garlic, shallot etc), as well as courgette, pepper, aubergine, and mushrooms. Therefore it could be argued that interpreting the vegetable intake of participants may be viewed as of limited value as it does not capture data regarding consumption of all varieties of vegetables. The data for fruit intake was captured from just three items (fresh fruit, fresh juice and carton/tinned juice). The vast majority responded that they ate fruit at least once a week ($n=17$), with a high number of those eating it daily ($n=11$), and fresh fruit juice was more frequently drunk on a weekly basis ($n=14$) than carton/tinned juice ($n=3$).

Pregnant women are advised to consume 2-3 servings of reduced fat dairy produce daily (DOH, 2007). The questionnaire asked women about their milk and cheese consumption but interestingly yoghurt was not included. The data relating to usual milk consumption showed a clear preference for the lower fat options as per the Pregnancy Book advice, with most participants opting for semi-skimmed milk ($n=13$) or skimmed-milk ($n=7$), and only a few usually choosing to have full-fat milk ($n=4$).

Protein intake of participants was typically obtained through the consumption of meat, with poultry being eaten at least once a week by 75% of participants ($n=15$), and red meat by 60% ($n=12$). Intake of processed meat in the form of burgers and sausages was less frequent (at least weekly $n=3$, fortnightly $n=9$) than other meat products with many reporting they never or rarely ate them ($n=8$). Two items asked participants about their consumption of fish: White fish was eaten at least weekly by only a small number ($n=3$), but the number of women who reported weekly intake of other fish such as tuna, mackerel and sardines etc. was higher ($n=6$). Other popular sources of protein were consumed in the form of eggs and baked beans. With only one participant classifying herself as vegetarian consumption of pulses or meat substitutes such as soya or bean curd was minimal.

Despite inclusion within the Eatwell plate, energy dense foods that are either high in fat and/or sugar are not a necessarily part of a healthy diet but if eaten should make up only a small proportion of daily diet (maximum 7%). Three items on the questionnaire asked about energy dense savoury foods commonly eaten as part of a meal, these were; pies/pasties, pizza as well as chips. Small numbers of women reported eating pies/pasties ($n=3$) and pizza ($n=4$) on a weekly basis. More commonly these foods would be eaten once a fortnight ($n=10$ for both). Chips were eaten more frequently with

higher numbers eating them weekly ($n=10$) or fortnightly ($n=7$). The PFFQ also asks about monthly takeaway consumption, which more often are foods considered to be high in fat. The majority of women reported that they had takeaways infrequently (1-2 times a month $n=15$) with only 15% eating them slightly more often than that (3-4 times a month $n=3$). Six items quizzed women regarding their intake of energy dense snacks. Crisps were the most popular snack with the vast majority eating these weekly ($n=17$), two of whom ate more than one packet a day and only one reporting that she rarely or never ate them. Participants reported consuming confectionary bars (e.g. Mars, Twix etc.) and bars of chocolate (e.g. Dairy milk) frequently with 80% ($n=16$) and 55% ($n=11$) respectively doing so at least once a week. The intake of sweets on a weekly basis was relatively high too ($n=11$), and a couple of women ate sweets more than once a day. Furthermore cakes and biscuits were often consumed at least once a week ($n=7$ and $n=9$ respectively). Regardless of the current advice for pregnant women to limit these types of foods, it is evident from this sample that prior to the intervention programme, energy dense foods, especially snacks were being consumed relatively frequently and in most instances appeared to be eaten more frequently than the vegetable items that were listed. Participants were asked to record their food frequency in the four weeks prior to recruitment in the study. Data was therefore being captured for the end of the first trimester and beginning of the second (between 10-14 weeks gestation) when many of the women may still have been experiencing some NVP and therefore this may have influenced their food consumption.

Past dieting behaviour was captured through 3 questions, and their response provides an insight into the levels of the historical weight concern. Interestingly 55% ($n=11$) of the women in this sample had previously been on a diet to lose weight, and this finding is similar to other studies with the non-pregnant population (Wardle and Johnson, 2002). For those who had dieted in the past, the majority had done so once or twice ($n=7$), two participants had dieted between 3-5 times and one reported that she had been on a diet to lose weight more than 10 times. Dieting tended to last for longer than 3 months ($n=7$) although a small number reporting having dieted for less than a month ($n=3$).

The data gathered from the PFFQ, gives an indication into the food consumption of the sample, however this must be treated with caution because of the small sample size, therefore it is not possible to generalize the findings to the pregnant population as a whole. When comparing the results of the PFFQ with the current advice regarding a balanced diet, as seen by the Eatwell plate, fruit and vegetable intake of participants appears to be lower and consumption of energy dense snacks higher than they should

be. This result has been found by other researchers (Wen et al., 2010, Verbeke and De Bourdeaudhuij, 2006), and it could be argued that these are two areas where pregnant women's diet could be addressed in order to improve their diet quality.

5.4.3 Physical activity

The responses given by participants for the PPAQ provided data regarding reported types of physical activity undertaken over the four weeks prior to completing the questionnaire and therefore prior to the intervention. Frequency tables for the PPAQ responses can be found in the appendices (Appendix 21).

Analysis of the physical activity expenditure (in MET-h°week) of pregnant women within the sample was categorised by type of activity as well as the intensity of activity (see Table 12). There was a good deal of variation in the total number of MET-h°week between participants (range 43.15 – 681.65), with a mean of 253.52.

Data from four types of activity was obtained: household & caregiving, occupational, transportation and sport & exercise. Occupational activity was the most significant contribution to total energy expenditure in mean MET-h°week, although this too varied considerably from person to person as some participants had relatively sedentary jobs, whilst others were much more active (range 17.85- 437.50). Three participants in employment had MET-h°week of > 390, though the majority had <100 MET-h°week (n=13).

Table 12 Physical activity of participants mean MET-hours/week

| | Mean MET-h°week | N | Standard Dev | MET = 0 (n) |
|-------------------------|-----------------|----|--------------|-------------|
| Total activity | 253.52 | 18 | 161.65 | 0 |
| Activity: | | | | |
| household/caregiving | 77.39 | 20 | 59.22 | 0 |
| occupational | 124.16 | 20 | 138.10 | 2 |
| transportation | 27.68 | 19 | 15.96 | 1 |
| sports/exercise | 9.88 | 19 | 8.76 | 1 |
| Intensity: | | | | |
| Sedentary (<1.5 METs) | 56.78 | 20 | 34.94 | 0 |
| Light (1.5-2.9 METs) | 98.45 | 20 | 58.60 | 0 |
| Moderate (3.0-5.9 METs) | 96.27 | 18 | 121.28 | 0 |
| Vigorous (≥6.0 METs) | 1.55 | 19 | 2.74 | 13 |

Household and caregiving was the second highest contribution to overall energy expenditure with a mean of 77.39 MET-h°week, followed by transportation (27.68 MET-h°week) and lastly sport and exercise (9.88 MET-h°week). These results are similar to those found by other researchers (Chandonnet et al., 2012, Wojtyla et al., 2012), except for the figure for occupational activity, which in this study was far higher. The current advice is that healthy pregnant women should do 30 minutes of exercise on five or more days a week. The mean total time spent in exercise/sport was nearly equivalent to the recommendations (149 minutes SD= 111.86). However, there was a wide variation in this result (ranging between 0-390 minutes) and when investigated further, only 6 participants had met the guidelines (see Table 13).

Table 13 Total number of minutes/week participants spent exercising

| Minutes per week in exercise | <i>n</i> |
|--------------------------------|----------|
| missing | 1 (5%) |
| None | 1 (5%) |
| <60 mins (less than 1 hour) | 4 (20%) |
| 60- 149 mins (1-<2.5 hours) | 8 (40%) |
| 150-240 mins (2.5-4 hours) | 2 (10%) |
| > 240 mins (more than 4 hours) | 4 (20%) |

Metabolic equivalent tasks (METs) can be classified by their intensity. 1 MET is equivalent to the energy expenditure of the body at rest. Less than 1.5 MET's is

considered to be sedentary, 1.5-2.9 METs is classed as light activity, 3-5.9 moderate and METs greater than 6 are classed as vigorous activity. Thus it is possible to assess participant activity according to classes of intensity (see Table 12). Analysis of participants' activity levels by intensity showed that light activity (1.5-2.9 METs) accounted for the most energy expenditure (mean 98.45), followed closely by moderate activity (mean 96.27). Sedentary activity made up just under a quarter of the total energy expenditure (mean 56.78), and less than 1% (mean 1.55) of energy expenditure was the result of vigorous activity. Again these figures are similar to the results from other studies with pregnant women (Wojtyla et al., 2012, Chandonnet et al., 2012), with the exception of the mean result for moderate intensity activity, which was elevated by two participants who had score >300 MET-h°week. All other participants had a moderate intensity score <130 MET-h°week with the majority (n=10) scoring <60 MET-h°week of moderate physical activity.

5.4.4 Self Determination Theory constructs

Prior to and six weeks after the intervention, measures of autonomy and competence relating to an individual's motivation to pursue a healthy diet and to keep physically active were obtained via the Treatment Self-Regulation Questionnaire (TSRQ) and Perceived Competency Scale (PCS). Evaluation of how autonomy supportive or controlling they found the 'Eat Well Keep Active' programme was also collected via the Health Care Climate Questionnaire (HCCQ).

5.4.4.1 Internal reliability

The internal reliability of the three subscales contained within the TSRQ and the PCS and HCCQ for diet and physical activity was assessed using Cronbach's alpha (α) and can be seen in Table 14. Kline (1999) suggests that although alpha values of .8 and .7 is appropriate for cognitive tests and ability tests respectively, due to the diversity in psychological constructs, alpha values of <.7 can be expected (Kline, 1999). The Cronbach's alpha for the autonomous and controlled subscales in both diet and physical activity behaviours suggest a good internal consistency (<.8). However, the alpha reliability for the amotivation subscale for both domains was exceptionally low (<.5), and may suggest that for this particular population the three items were unrelated and therefore could not be considered to be measuring a single scale as such. Many

other researchers using the TSRQ have also found poor internal reliability with the amotivation subscale with alpha scores ranging from between .20 and .55 (Reed-Knight et al., 2011, Zoellner et al., 2011, Masse et al., 2006). Cronbach's alpha is affected by the number of items in any scale, thus scales with many items can positively affect alpha scores, conversely scales with only a few items will negatively impact upon the score (Field, 2009), this might explain why the amotivation subscale has been found to have low scores as it only contains 3 items. The internal consistency for the PCS and HCCQ were good for both behaviours with Cronbach's alpha $>.8$.

Table 14 Alpha reliabilities of the TSRQ subscales, PCS and HCCQ.

| | DIET | PHYSICAL ACTIVITY |
|--|---------------|-------------------|
| TSRQ Time point 1: | | |
| Autonomous | α .78 | α .82 |
| Controlled | α .86 | α .81 |
| Amotivation | α .011 | α .44 |
| TSRQ Time point 2: | | |
| Autonomous | α .85 | α .87 |
| Controlled | α .65 | α .80 |
| Amotivation | α .47 | α .21 |
| Perceived Competency Scale | | |
| Time point 1 | α .87 | α .95 |
| Time point 2 | α .95 | α .96 |
| Health Care Climate Questionnaire (Time point 2 only) | α .88 | α .92 |

5.4.4.2 Correlations & descriptive analysis of data

It is conceivable that the two separate behaviours under investigation; diet and physical activity, could be combined under the heading of 'healthy lifestyle' and be analysed as a whole. However, for the purpose of this research these behaviours have been analysed separately as it was felt that both motivation and perception of competence may differ between the two health domains. For example an individual may feel strongly motivated to consume what may be considered a healthy diet, and perceive that they are capable of doing so, yet they may feel very differently about their motivation and ability to keep physically active. Therefore the results for each domain will be looked at in turn.

DIET

The data from the Likert scales was deemed to not meet the criteria for parametric testing and therefore when analysing the correlations within the data, Spearman's was the test used. For the TSRQ which looked at the three subscales on the self-determination theory continuum, as the subscales have been found to adhere to a 'quasi-simplex pattern' (Gagne and Deci, 2005), one would expect to find a more positive correlation between those subscales which according to the theory are closer together on the continuum, than those which are further apart. Therefore there should be a more positive correlation between autonomous and controlled regulated behaviour than between autonomous and amotivated behaviour. As the amotivation subscale has been found to be unreliable, it would be inappropriate to use it in such an analysis. However the theory would also predict that perceived competence would have a stronger correlation with autonomous than with controlled. Table 15 presents the correlations between the subscales of the TSRQ as well as the PCS.

Table 15 Spearman's correlation matrix for the TSRQ & PCS - diet

| | Autonomous | Controlled |
|----------------------------|------------|------------|
| Controlled | .515* | - |
| Perceived competency Scale | .812** | .372 |

*=Significant at $p < .05$

**=Significant at $p < .01$

From the results of the tests for correlation, within the TSRQ, as expected there was a significant positive correlation between autonomous and controlled regulation of dietary behaviours. Furthermore the PCS correlated significantly with autonomous subscale but not with the controlled subscale, and indeed the correlation coefficient was higher for this correlation ($p < .01$) than for that between the two subscales of the TSRQ ($p < .05$).

The mean scores for diet from the TSRQ and PCS were obtained from both time points, at baseline and 6 weeks following delivery of the intervention, which may be considered to provide an insight into the effect of the intervention of an individual's perception of competency and their sense of self determination with regard to their diet. Table 16 shows the means and standard deviations (SD) for the PCS and the subscales of the TSRQ at both time points. At baseline participants rated themselves highly for their autonomous motivation to eat healthily (Mean 5.31, SD 1.02 on a 7 point Likert scale), and also had high scores for the perceived competence to eat a healthy

diet (Mean 5.10, SD 1.20). Controlled motivation scores were lower (Mean 3.21, SD 1.38).

These scores are derived from the 19 participants who completed the study. The data obtained from the single participant who withdrew following the intervention, showed that her scores were close to the mean scores across all the scales in both dietary and activity domains. In other words her scores did not appear to be deviant.

Table 16 SDT diet scores over time; mean (SD)

| | Baseline | 6/52 post intervention |
|----------------------------|----------------|------------------------|
| Perceived Competency Scale | 5.10 (1.20) | 5.14 (0.89) |
| TSRQ: | | |
| Autonomous | 5.31 (1.02) | 5.65* (0.89) |
| Controlled | 3.21 (1.38) | 2.89 (0.93) |

*=Significant at $p < .05$

Differences in the scores over time were compared using Wilcoxon matched pairs tests. As can be seen in Table 16, the means score for both perceived competency and the autonomy subscale increased however the controlled subscale mean scores decreased over time. The only significant difference was for the increase in autonomy scores from baseline to follow up (z score= -1.829, p value=.033). Detecting differences in scores between the two time points may be attributed to the timing of both the intervention and questionnaire. The first questionnaire was completed between 14-16 weeks gestation and the follow up between 20-24 weeks. Some of the women may still have been feeling the effects of the NVP at the first time point, and so the difference in score may simply be the result of the decrease in these symptoms. Therefore it is not possible to attribute any increase in scores as being solely the effect of the intervention.

EXERCISE

Interestingly the correlations that might be predicted to be found in the TSRQ between the subscales, which were seen in the diet domains were not found to be significant

within the exercise domains (Table 17). There was no significant correlation between the subscales, but perceived competency was positively correlated with the autonomy subscale. This finding provides some justification for not combining the two health domains, as it would appear that participant's perception of their eating behaviour differed somewhat from their physical activity behaviour.

Table 17 Spearman's correlation matrix for the TSRQ & PCS - exercise

| | Autonomous | Control |
|---------|------------|---------|
| Control | .271 | - |
| PCS | .510* | -.072 |

**=Significant at $p < .05$*

The mean scores for exercise from the results of TSRQ and PCS for both pre and post intervention were calculated (see Table 18). At baseline participants pattern of scoring on the subscales concerning their reasons to exercise was similar for their motivation to eat healthily, with autonomous motivation scoring higher (Mean 5.15 SD 1.12) than the controlled motivation (Mean 2.87 SD 1.20). The scores from the PCS also demonstrate that participants felt confident in their ability to exercise (Mean 4.70 SD 1.32) although it is worth noting that these scores were lower than the scores regarding their dietary behaviour.

As can be seen in Table 18, when it came to exercise behaviour the mean scores from the PCS and the subscales across the TSRQ increased marginally over time, although none of the changes were deemed as being statistically significant.

The results obtained from the HCCQ, regarding participant's perception of how autonomy supportive/controlling they found the 'Eat Well Keep Active' programme can also provide an insight into acceptability of the intervention. When it came to diet, participants reported that they found the programme highly autonomy supportive (Mean 6.65 (SD 0.50) and exercise had a similar result (Mean 6.68, SD 0.52).

Table 18 SDT physical activity scores over time: mean (SD)

| | Baseline | 6/52 post intervention |
|----------------------------|----------------|------------------------|
| Perceived Competency Scale | 4.70 (1.32) | 4.92 (1.03) |
| TSRQ: | | |
| Autonomy | 5.15 (1.12) | 5.35 (1.07) |
| Controlled | 2.87 (1.20) | 2.89 (1.17) |

5.4.5 Acceptability of the ‘Eat Well Keep Active’ intervention

Acceptability of the intervention was assessed through the responses given to questions during the course of the one to one interview (see interview guide 0). Acceptability of the intervention appeared to be exceptionally high. Results from the follow-up interviews showed that when asked, 100% ($n=19$) of participants felt the intervention programme to be acceptable with 95% ($n=18$) feeling that it had made a positive change to their lifestyle, improving both their diet and their activity levels. However, the loss to follow-up of one of the participants could be interpreted negatively on the acceptability of the study. The reasons for her withdrawal are not known as it was made clear to all participants at recruitment that they could withdraw at any point without needing to provide a reason. It is therefore, not possible to rule out the notion that for one participant the programme may have been unacceptable.

Acceptability of the intervention is likely to have been influenced by participant perception of its efficacy. Taking part in the study involved participants usually giving about 1-1.5 hours of their time and if they had believed this made no difference to their diet or physical activity, they might have felt negatively about this use of their time and acceptability would have been lower. However, there was one participant who felt that inclusion in the study made no difference to her diet or activity levels and she classed herself to be fit and healthy.

“I think for me, because you know, my outlook is to be quite healthy anyway, then I don’t think the study actually influenced me to make the changes” (Holly, 25 years Primip, BMI=20)

Holly did however; feel that the programme would be of benefit to those pregnant women who were not so health conscious. What was interesting is that Holly did use the goal card sent to her and reported referring back to it daily. So although she felt that inclusion in the study did not influence her behaviour, the goal card was still utilised frequently and thus it must be assumed that she found it was of benefit.

Interestingly three of the participants prior to the intervention, reported having extreme difficulty with their diet and activity due to nausea and vomiting in pregnancy (NVP). All three were clearly quite distressed at how poorly they felt and this resulted in them becoming fearful of eating and also fearful of going out in case they vomited in public. They mentioned feeling alone, and isolated by their experience, and when the NVP worsened to the point where they sought medical help, they were often treated with medication alone. Bethany recalled that despite feeling very ill indeed she did not feel that she received much support from the maternity service.

“And that’s not really the best thing (the medication), because they didn’t work for me.....Nobody really checked on me or anything. Obviously they just sort of leave you to have your hyperemesis in peace!” (Bethany, 23 years, Primip, BMI=21, NVP)

As they report feeling a lack of support with their NVP, it may be that these three women felt the ‘Eat Well Keep Active’ programme was particularly appealing as it gave them the opportunity to discuss their diet with a health professional, seeking answers to questions and asking for self-help suggestions to improve their diet.

“I was ecstatic after it. Because I walked back into the office and I went “Now I understand it and someone understands me!” and everyone has noted such a difference in work.... For me it has been the best thing” (Ellie, 34 years, Primip, BMI=22, NVP)

Antenatal provision for the treatment of severe NVP and hyperemesis comprises of antiemetic medication and in extreme cases intravenous fluids in order to rehydrate (Neil, 2011). It does not usually include dietary counselling or the opportunity to talk about their diet (NICE, 2008), and it is apparent that these women really valued this aspect of the programme. It is worth noting that this may be the key reason that they agreed to participate in this piece of research.

All the women who took part in the study were asked whether there was any part of the intervention programme that they thought should be removed. There was no aspect of the ‘Eat Well Keep Active programme’ that was identified. The only negative aspect of participating in the study, cited by a quarter of the women ($n=5$), was the

questionnaires. When probed further it was apparent that it was the HC-SDT pack that provoked the response. The reasons given for the dislike of this were; that it was too long, or that they didn't see the value in it. However this did not deter them from completing the questionnaires and indeed the response rate was 100%.

Participants were asked their views on the three aspects of the 'Eat Well Keep Active' programme; the counselling session, the goal setting and goal card and the follow-up phone call. The responses for each of these aspects will be looked at in turn.

5.4.5.1 The counselling session

A number of women reported that the first counselling session assisted them to readdress their eating and physical activity behaviour and several talked about this session making them think differently about their diet and exercise.

"You were asking me what I ate and I thought, I'm not that bad, I eat brown bread and stuff, but then I have a really sweet tooth. So it makes you think differently it did" (Katie, 22 years, Primip BMI= 22)

"I just thought it made you think about what you are putting inside your body. You know you go shopping on an empty stomach and you think, oh I'll have a pasty or I'll have a cake. And you're just shovelling it down yourself and you don't even think about it! But it does make you think. That's why we bought loads more fruit and vegetables" (Sammi, 35 years, Para 1, BMI=28)

Views like the above by Sammi suggest that some participants had not really thought to look at ways to improve the quality of their diet. Any changes they had made prior to inclusion in the study, tended to be avoidance of food associated with infection. The counselling session was designed to be woman-centred. It was felt that a directive approach coupled with unsolicited advice may have been viewed by participants as confrontational and it is likely that it would have been met with resistance. An example of this was noted when one participant recalled the unsolicited advice she had received from her midwife, about her smoking; Toni's choice of words shows how defensive this made her feel:

"I think the only thing she actually did do was to have a go at me about the smoking" (Toni, 31 years, Para 1, BMI=26)

Through using a more client-centred approach, women were able to identify areas that they wanted to address and the reasons for doing so, without feeling the need to defend

their current behaviour. This can be seen in Cathy's response when asked about her view on the first session:

"It was something that was always in the back of my mind,[to change her diet] but I never like, aired my views sort of thing, and it was only because you were talking about it, it was only then that I thought I could put my point across sort of thing." (Cathy, 36 years, Para 1, BMI=23)

The first session provided Cathy with the opportunity to explore how she felt about her diet and the aspects that she was concerned about and what she could do to address it and it is clear that she was able to do this without feeling judged, a key aspect to Motivational Interviewing (Mason and Butler, 2010).

Several women reported that they had intended to make changes to their lifestyle, although lack of motivation meant they had deferred it and demonstrates the ambivalence they felt towards the prospect of behaviour change. These women felt that the counselling session provided them with the increased motivation to kick start behaviour change. This increase in motivation was not the result of external pressure, but it appeared to be a rather more self-determined form of behaviour, where individuals suggested that reasons for behaviour change were important for their health and that of their baby, and I would argue that this may provide evidence of these participants falling into the identified or integrated regulation of behaviour at the higher end of self-determination on the continuum (see Table 9 page 172).

"I was aware I needed to be healthy and things, which is why I agreed to it, because I wanted to do the best really, it was good. I enjoyed it." (Daisy, 35 years, Primip, BMI=22, NVP)

"It just got you thinking about what was best for you and for your baby as well I suppose" (Holly, 25 years Primip, BMI=20)

For some the counselling session gave them a sense of reassurance. Although many understood what a healthy lifestyle in general should comprise, being pregnant made them have some doubts. This session therefore gave them the opportunity to seek advice and reassurance and also to address the areas that they felt needed improvement. This was especially noticeable when it came to physical activity or exercise.

"Actually the chats just give you the reassurance, the piece of mind that, you know, it's OK to push yourself a tiny bit" (Issie, 31 years, Primip, BMI=29)

It is likely that because the women knew that I was a midwife, they felt confident that if I was saying that it was good to increase activity levels, then they in turn felt it was safe to do so. As with the previous study and other research (Clarke and Gross, 2004, Weir et al., 2010), it was apparent that these women had anxiety that exercise during pregnancy may be harmful or risky to them or their growing baby. However, it also showed that with a little reassurance from a health professional, their anxiety could be abated. Through listening to them and their concerns and answering their queries these women felt enabled to make changes to their lifestyle and to do this confident in the knowledge that it would be of benefit to them and their baby.

“Before [the study] I used to think, if you are stamping and bouncing you think oh my God there is something there, you have to protect it... But no, it’s protected anyway.” (Geri, 31 years, Primip, BMI=24)

The counselling therefore enabled participants to change their perception of exercise from being viewed as a negative health behaviour during pregnancy to being a desirable behaviour.

5.4.5.2 The goal card

Examples of the goals identified by the participants can be found within the appendices. Predominantly the goals tended to be food or diet related, but all participants also made exercise or activity goals that they would like to achieve. During the goal setting exercise, a number of participants also identified goals that they wanted to accomplish which were unrelated to either their diet or activity. This provides evidence of the autonomy supportive approach used during the goal setting, where individuals identify those behaviours that they wished to change; those that they felt were pertinent to them and their situation.

The habitual nature of diet and physical activity means that in order for an individual to implement a change, often they need to be able to replace one behaviour with another healthier one. Examples include swapping unhealthy snacks such as chocolate and crisps with fruit or nuts, walking the children to school instead of driving them in the car. And this requires an element of planning. The goals often reflected this.

“I used to have like a big bag of crisps round with me but I don’t do that now. I’ve got cereal bars, nuts more fruit. I’m doing it to protect the baby you know and it’s good for myself as well.”(Daisy, 35 years, Primip, BMI=22)

Others had less specific and more generalised goals, which they found worked for them.

That goal card is good you know: Eat more fruit! Oh yes, OK it's on my goal card so I will, it's written down!" (Cathy, 36 years, Para 1, BMI=23)

When participants were asked about how they felt about the goal card, all responded positively and reported that they had found it of use and had referred back to it. For some the goal card acted as reminder and when they looked at the card it prompted them to ensure they achieved their goals.

"I would read it and I'd say I'm doing this and I can't do that today, but I'll do it tomorrow, or I've got to go out for a walk even if it was just a quick one." (Amy, 22 years, Primip, BMI=21)

"It's a bit of clarity just to say, right this is what I am aiming for. And it just reminds you as well. I quite liked the fact that it's there on my fridge like that, where my food is." (Jenny, 33 years, Primip, BMI=24)

The convenience of having their goal card as a magnet that could be placed on the fridge made it readily accessible and this was mentioned by several women. Two women said that having it as a constant reminder meant that after a while, they had managed to memorise their goals, without the need to read them.

"I put it on the fridge because I thought if I put it away now, I'd forget it, it's been there ever since, but I realised that I didn't have to keep looking over it because I had them in my head." (Nancy, 18 years, Primip, BMI=24)

The participants reported that the individualised goal card they received made them feel confident to be able to make lifestyle changes to improve their health. It provided them with concrete evidence of the goals they had said they wanted to achieve.

"I think that when you came and we had the chat and we went through the goals. When you left, I had a plan. And I knew what I was doing, and I found that really beneficial. It really made a difference to me. [The goals] didn't put any pressure on me, but they filled me with confidence in what I was doing and I thought it was good, I really do." (Issie, 31 years, Primip, BMI=29)

An unexpected finding of the goal card, was the involvement of significant others in their goal pursuit. Only one of the participants included her partner in the goal setting exercise, yet many reported that having the card meant that their partner would read and see their aims and support them in their goal attainment.

“He loves it so he can say: ‘Are you eating this? Are you eating this?’ Something in black and white you know. They are good they are.” (Daisy, 35 years, Primip, BMI=22, NVP)

It is evident that the women welcomed the involvement of their partners in the programme and that they assisted them to achieve their goals. It was also apparent that their partners responded positively to their aims. As identified within the SDT literature (Deci and Ryan, 2002), perceiving that one’s goals or aims are in line with those of their significant other acted to support their need for relatedness and in doing so, helped them to maintain their motivation.

“And I think because my husband was able to see my targets and my goals, he helped keep me focused as well. He would say ‘you should really do this today’, so he would sort of keep me motivated, which was nice.” (Toni, 31 years, Para 1, BMI=26)

Many women discussed the merits of having goals that they had identified and felt they were relatively easy to implement and achieve. Rather than change their lifestyle completely, which would have been unrealistic, the women were assisted to see that they could make small changes which made the task of improving their diet and physical activity levels more doable and therefore more successful.

“Even just changing things like crisps to nuts, that’s quite an easy thing to do. When you combine it with everything else then, you think it’s this big mammoth change that I have to do. But actually when you get down to it, it’s not too bad.” (Toni, 31 years, Para 1, BMI=26)

The data demonstrated that achievement of goals that they had set themselves, gave the women a sense of accomplishment and wellbeing. For some this meant they felt able to aim for further improvements to their lifestyle behaviours, above and beyond the initial goals.

I wanted to do the little steps, little steps on the goal card. And once you’ve done them you feel so good about yourself that you think, well actually I am going to try something bigger.” (Vicki, 20 years, Primip, BMI=20)

“No I have found it really easy to adapt to, to be honest. And I’m going to keep that goal card for after. Because then I think, if I find myself slipping I can just look at it and go ‘oh yeah, I did it when I was pregnant, feeling all hormonal so I can do it now’. So I am going to keep it and maybe even add to it, when I go power walking with my pram!” (Cathy, 36 years, Para 1, BMI=23)

In Vicki’s case the successful accomplishment of goals meant that she not only felt that she could go for longer walks or cut crisps out of her diet completely, but also she could

attempt to give up smoking, an area of her lifestyle behaviour which in the past she had demonstrated strong resistance to change.

*“I have actually given up smoking completely because I thought to myself, right. If I can do these things, I have given up the crisps, I never used to have breakfast before, but I have started to eat breakfast so I thought to myself, well I will give it a go”
(Vicki, 20 years, Primip, BMI=20)*

Smoking was not a behaviour that had been discussed during the initial counselling session and goal setting exercise, yet it was apparent that during her follow-up interview, that her sense of success in achieving her initial goals gave her confidence to address other areas of her lifestyle. This was an unexpected bonus of the effect of the intervention for both me and Vicki.

5. 4. 5. 3 The follow-up phone call

Although the phone call was brief, lasting approximately 5 minutes, when participants were asked what their views were on this aspect, all of them felt it was worthwhile. Several women described the phone call as acting like a prompt in assisting them to stay on track with their aims.

“It was fine. Like I said to you some days are good and some not so good, so speaking to someone then makes you think. Oh get back on it. Or come on start again tomorrow” (Martie, 32 years, Para 1, BMI=23)

*“It was sort of like, well not a refresher but sort of like a bit of a pep talk. How are you going? How are you getting on and is there anything you need to work on? No it was really useful.”
(Ellie, 34 years, Primip, BMI=22, NVP)*

“It was good just to keep an eye and act as a reminder” (Gerry 31 years, Primip, BMI=24)

Other participants felt that the telephone call provided them with some extra support. For some this meant that it gave them the opportunity to talk through the difficulties that they had been encountering.

“Yeah it was fine. It was just probably nice to speak about it then. Just to say how I was getting on. So to say that I was having difficulty with the crisp goal” (Holly, 25 years Primip, BMI=20)

“You haven’t been too pushy, you know. You gave a quick phone call and answered any questions I had. You were there on

the other end of the phone. So I think it's good to have that extra support that people really need" (Polly, 24 years, Primip, BMI=23)

During the phone call it was my aim to ensure participants felt supported in achieving their goals; they were given encouragement and praise for the targets they had met and importantly they were not being made to feel judged if they were having difficulty with them.

"If I say I'm not doing so well on this point, you wouldn't be like. Oh well that's not good enough, you know. And it's a comfortable conversation, it's not forced. It wasn't, have you been doing it? Or why haven't you been doing it. It was a gentle push... And it was nice that you were giving us encouragement as well. Saying you know, well done. You've done well. It gives you a bit of extra motivation to carry on doing it (Vicki, 20 years, Primip, BMI=20)

It would appear that this encouragement helped Vicki to feel achievement and these feelings of success served to increase her motivation. This may be seen as support for the notion that feelings of competence enhance an individual's motivation (Deci and Ryan, 2002), and this finding was not limited to one participant:

"It felt OK you know, because I sort of wanted to say, yeah, I've done it! Just brag to anyone! Just to tell you like, I have been doing that and I have cut down a lot. You know, a bit of motivation really" (Amy, 22 years, Primip, BMI=21)

For several women it was clear that their sense of accomplishment resulted in them feeling proud of their success and wanting to share this. For these women the phone call gave them the opportunity to report back on their achievement with pride.

"I was impressed with myself. I was chuffed when you phoned me because I thought I've done really well and I was really excited when you spoke to me on the phone. Trying to, you know, not please you but, I was pleased with myself and wanted to show you. Look no crisps!" (Sammi, 35 years, Para 1, BMI=28)

"It was quite nice actually to tell you what I have done, you know, To be able to say, well actually I have done this and I have done that. And I'm quite pleased with the fact that I have done this." (Toni, 31 years, Para 1, BMI=26)

"It was a fun telephone call. I was actually looking forward to speaking to you to say that I had swam in the pool in the rain on my own, for you! [laughter]" (Issie, 31 years, Primip, BMI=29)

A number of the women found the follow-up phone call especially rewarding, it would seem that someone taking the time to telephone them to see how they were doing with their goals made them feel valued.

“I thought; she’s actually taken an interest. So I thought, oh yeah, it’s not just forgotten. So it was nice. Someone to ask me how I’m doing.” (Felicity, 20 years, Primip, BMI=22)

“It was nice to have the follow-up phone call. It was nice to have someone check how you are doing”. (Bethany, 23 years, Primip, BMI=21, NVP)

As described in the method of analysis section (see page 203), an analytical framework using the fundamental psychological needs was used to assess the fidelity of the intervention programme in supporting autonomy, competence and relatedness as identified by Self Determination Theory. The transcripts were therefore coded according these needs.

5. 4. 5. 4 Supporting autonomy:

‘You asked me what I wanted to change’

The intervention programme was developed utilising theory from SDT and MI and therefore at its centre was the aim to support women’s sense of autonomy in assisting them with behaviours that they wished to change. Having autonomy is to perceive you are the origin of one’s behaviour (Deci and Ryan, 2002). Consequently it was important that during any contact with participants, choice and personal control were emphasised, to ensure any behaviour change was volitional and coming from within themselves.

During the interviews the participants reported volitional behaviour especially when discussing how they felt about the goal setting and goal cards resulting in them clearly identifying ownership of the goals.

“I think everybody has got like an individual plan and that I think makes a difference. Everyone’s is individual and it does alter depending on what they are trying to do and what their plan is and stuff.(Issie, 31 years, Primip, BMI=29)

“Because I made the decisions in the first place, not you. I made them and you just typed them out for me really!” (Cathy, 36 years, Para 1, BMI=23)

The women recognised that the goal card was individualised, they were not being given generic targets to aim for, rather the programme was client centred in that they were identifying the areas they wished to address, areas that were pertinent to them.

“It wasn’t that you were telling me, It was from what you said that I put solutions there really” (Daisy, 35 years, Primip, BMI=22, NVP)

“It’s individual to the person and it’s more or less the goals that they set for themselves but hadn’t thought about before” (Polly, 24 years, Primip, BMI=23)

For both Polly and Daisy, it is evident that the programme worked to elicit change by identifying goals that they wanted to achieve. They understood that the goals were coming from within them that they could explore their views without feelings of being judged and that they were putting in the solutions themselves.

Some reported that they recognised the approach used during consultation was different from the approach they might have expected with a health professional, in that they were not being told what they should do, but were being asked what they wanted to do.

“Because you asked me what I wanted to change. So most health people say you should change this if you are doing this and to change that. And they were my goals, not like someone else’s just thrown at me! That might not mean anything to me then” (Amy, 22 years, Primip, BMI=21)

During the goal setting participants were encouraged to be the decision maker when it came to behaviour change. For example, for some that meant they would reduce their consumption of unhealthy snacks such as crisps. They were not being told to stop eating these altogether, instead they were being encouraged to think about things they could do to improve their diet and physical activity levels. And as a result the women felt that these changes were being driven by themselves, thus their sense of autonomy was supported.

“They were definitely the things that I have always thought about changing, but just haven’t got around to changing.” (Toni, 31 years, Para 1, BMI=26)

“They were what I wanted to do anyway, yeah. You didn’t come in here and crack a whip! You’ve got to do this. You’ve got to do that! (Gerry, 31 years, Primip, BMI=24)

5.4.5.5 Supporting competence:

'I was impressed with myself.'

An environment that supports an individual's belief in their ability to affect their behaviour is fundamental to successful behaviour change. Therefore competence is seen as a fundamental psychological need and a key component of self-determined behaviour (Deci and Ryan 2002). When the women discussed meeting their goals they talked about the sense of achievement and wellbeing it gave them. Many felt pride that they had met the goals they set themselves, and this built on their sense of confidence that they could maintain these healthier behaviours, in other words they felt competent to effect change.

"The more of an effort I've made the better I've felt afterwards, so you know I've thought, yes. There is a reason I should be doing this. Not just because I feel I should do it, but because I know it's good for me if I do it. I feel better if I do it" (Toni, 31 years, Para 1, BMI=26)

"It gave me, not something to do but something that I think, Oh I've done that now. I look back on it and I think I did that now. So I feel better about myself" (Felicity, 20 years, Primip, BMI=22)

Several participants identified that the goals that they had set themselves were small but manageable; they were goals that they felt certain they could attain. Through making small changes to their diet and exercise the women gained confidence in their ability to improve their lifestyle.

"I cut it down and cut it down a bit more and it was a lot easier. It was better than saying; don't do this, because you make the changes gradually and get used to it and then you're doing it all the time." (Amy, 22 years, Primip, BMI=21)

"I have had things like carrot and humus, breadstick and humus or fruit. I have been eating loads of fruit. I haven't cut them out completely because I do still like crisps, but it's no longer a packet a day it's more like two a week which I think is OK." (Toni, 31 years, Para 1, BMI=26)

Some participants found the targets they had set themselves relatively easy whilst others found them more challenging and were not able to achieve all of them.

"It's not too difficult, it's just mind over matter. After a while you don't miss it, you know. I'm not bothered with missing the chocolate (Sammi, 35 years, Para 1, BMI=28)

“Some days have been bad; I’m not going to lie. But then some days have been quite easy to do it. So I know I can do it if I really, really want to. (Martie, 32 years, Para 1, BMI=23)

Martie appears to show some ambivalence in her behaviour change. She is confident that if she really felt committed to behaviour change she would be successful, however she interprets the times when she has encountered difficulty as being the result of perhaps a less strong motivation to change. Within the MI literature behaviour change can only occur when that change is deemed as being both important and attainable (Miller and Rollnick 2002). In this instance Martie reports that she feels competent to change but did not always feel that it is a priority, and this may explain why she was not always able to maintain the behaviour.

Some participants discussed how difficult they found some of the behaviour changes that they had set for themselves and talked about the strategies they used to assist them.

“The sweets were hard and the coke was hard as well. But knowing that I could still have it on the weekends and not cut it out fully was a bit better, you know. Knowing it’s only two more days and then I can have a can again. Oranges help me and grapes help me. Because they have a little bit of sugar in them in oranges which I didn’t realise, so I’m constantly eating them now” (Amy, 22 years, Primip, BMI=21)

Prior to the programme Amy was drinking cola on a daily basis and regularly ate sweets throughout the day. During the goal setting task she chose to cut down on these products rather than stopping altogether. Amy’s diet was significantly improved by the small changes she made; sugary drinks and snacks were limited to the weekends only and during the week she replaced them with fruit. This is an example of how making seemingly small changes helped participants to achieve their goals and built on their sense of competence. By participants determining their own goals, they were able to set themselves target that they felt confident they would be able to achieve.

“It’s just making sure it’s realistic, obviously I didn’t want to put anything in there that I knew I wouldn’t eat. It’s just being realistic really” (Rosie, 33 years, Para 3, BMI=29)

“I was impressed with myself. I was chuffed because I thought I’ve done really well” (Sammi, 35 years, Para 1, BMI=28)

5.4.5.6 Supporting relatedness:

'Even my husband says have you got your brown bread this week!'

In SDT support for relatedness is pivotal in the enhancement of motivation (Deci and Ryan, 2002). Therefore an environment which is able to foster support for an individual, giving them a sense of being connected to others can facilitate and maintain behaviour change. The women reported being supported by their partners in attainment of their goals.

"He's like, 'Right we are going to have to start this now, you need lots of fruit'. So he buys loads of fruit and the water and we have chicken breast and rice and veg for tea. So it helps when there's two and he does it as well." (Gerry, 31 years, Primip, BMI=24)

"If he is cooking then he just makes sure that it's something that has iron in it, you know like green vegetables, even though he doesn't like eating vegetables he has been eating them with me" (Holly, 25 years Primip, BMI=20)

Some women mentioned that the programme and more specifically the goal card helped their partners to support them in pursuit of their targets. It would seem that the partners took notice of the goal card and because it was devised in conjunction with a midwife, it appeared to be embraced by them. The partners identified that the goals were important for the women to achieve and they would refer back to the goal card and ask the participants how they were doing with their goals. The goal card enabled the partners to identify specific health behaviours that they could encourage and support. It may be seen that the goals were given credence by the woman's partner because they were devised with the assistance and support of a health professional.

"He was like 'How are you getting on with your targets for the midwife?' and I'd say 'well I haven't done this'. And he was like, 'you should really do this today because you haven't done anything today'. So he would sort of keep me motivated as well which was nice" (Toni, 31 years, Para 1, BMI=26)

"The goal card is on my fridge so I can look at it. Even my husband says 'have you got your brown bread this week?'...He loves that [the goal card] so he can say 'are you eating this? Are you eating this?' Something in black and white you know? (Daisy, 35 years, Primip, BMI=22, NVP)

Many of the women also mentioned that the healthier lifestyle was not just benefitting them and the baby but also their significant others and this acted as an increased incentive to maintain the healthy behaviours.

"It's not just me I'm thinking of the baby, it's the family as well. Because I want to keep them fit and healthy at the end of the day,. So it's everyone. This is not just for pregnant women!" (Sammi, 35 years, Para 1, BMI=28)

"If I was hungry he'd make me something healthy you know. And because he eats what I eat now, he's enjoying it so he's on a healthy diet now! So it's really nice" (Amy, 22 years, Primip, BMI=21)

The importance of maintaining a healthy lifestyle not just in pregnancy but also afterwards was mentioned in a few of the interviews with some women recognising how their behaviour would influence how their offspring's behaved and thus they wanted to be a good role model.

"I want to take the baby for a walk every day, so I will be doing a little bit of exercise every day. And I want to eat healthy, because I want the baby to be brought up healthy, I don't want it to be brought up on junk food. I want to be a good role model." (Amy, 22 years, Primip, BMI=21)

Social support from significant others has been identified as key to women's' perception of their weight management behaviours during pregnancy (Thornton et al., 2006, Tovar et al., 2009), and in this study it was evident from the discussions that these women highly valued the support they had from their partners to achieve and maintain their goals. This finding would appear to support the SDT notion that relatedness is pivotal in the enhancement and maintenance of motivation (Deci and Ryan 2002). Instances of evidence of the value of relatedness were not limited to partners and family as some women cited that they found the support that I provided, as the person responsible for the delivery of the intervention, assisted them also.

"I think to have someone, you know what I mean. Because obviously it's your job and you know what you are talking about. So to have someone to remind you that it's still important and that it does help the baby (Jenny, 33 years, Primip, BMI=24)

"Because you make people feel so comfortable, you know.... And it was nice to know you were thinking like; I'd better ring her and see how she's doing, it was nice." (Vicki, 20 years, Primip, BMI=20)

Markland *et al.*, (2005) proposes that through the expression of empathy, clinicians can demonstrate a support for relatedness, and this is a key aspect to motivational interviewing (Markland *et al.*, 2005). The intervention was designed to ensure that the women felt supported and free to explore how they perceived their behaviour through a non-judgemental empathetic approach and this was especially important when they reported setbacks. It would appear that this approach was popular with the women and that they found this supportive.

‘It’s just: ‘Here’s the bumpf see you in 12 weeks’

Supporting relatedness was not just confined to the woman’s partner as it also appeared to apply to their midwife. As with Study Two, participants in the intervention study reported a perceived lack of discussion with their named midwife when it came to healthy eating and physical activity behaviours during pregnancy. Instead it was noted that the participants were given a copy of the Pregnancy Book (DOH, 2009d) which includes a chapter on maintaining health in pregnancy and specifically focuses on how to achieve a healthy diet and maintain fitness through exercise. However as one participant noted not all women would take the time to read through the literature.

“They just give you these bumper packs and say read this. And how many do? It just gets put in the corner. But they just give it out you know. There’s no conversation like, you know, there’s this booklet that you will find really helpful. There’s none of that, it’s just; Here’s the bumpf see you in 12 weeks” (Polly, 24 years, Primip, BMI=23)

For some women there was a perception that the encounters they had with their midwives were not what they had been expecting, and as a result they felt disappointed. It might have been that their expectation of the relationship they would have with their midwife may have been too high. In Issie’s case (below) it would appear that she was not expecting to have to find information out for herself, but rather that she expected that she would be told all she needed to know.

“It should be part of the midwives care [discussion on a healthy lifestyle during pregnancy], I expected it to be part of the package. I didn’t expect to have to try and find out stuff.” (Issie, 31 years, Primip, BMI=29)

Although the antenatal visits were in line with the current recommendations regarding antenatal care (NICE, 2008), for a few women, the pattern of contact with their midwife as lead carer during their pregnancy appeared to fall short of their expectations.

"I haven't heard from her since I was 16 weeks, I'm 22 weeks now and I'm thinking that's a bit bad" (Vicki, 20 years, Primip, BMI=20)

"You're left to it. I've seen my midwife twice, once when I was about 10 weeks and once, just after my scan and the I'm going to see her at 26 weeks. And I'm like Oh my God I'm going to give birth in like 14 weeks you know!" (Polly, 24 years, Primip, BMI=23)

"It's your second pregnancy, you are in a low risk category we don't need to see you now till you're 28 weeks and you are kind of left to it. Ok, but what am I supposed to be doing in these weeks? I think you feel a bit lost really" (Toni, 31 years, Para 1, BMI=26)

This finding was also identified in study 2 where women talked about feeling isolated by a lack of contact with their midwife.

A couple of participants reported that they felt that encounters with their midwife were seen as a 'form filling exercise', where the midwife's concern for completing paperwork was in some instances misconstrued as a disregard for how that individual was adapting to their pregnancy.

"It's my first baby, I don't know what I'm doing! It's stressful knowing that you can find out more online than you can from your midwife. And she was just writing stuff down and this is changing my life and she's not even bothered!" (Vicki, 20 years, Primip, BMI=20)

"You have a lot of questions and you know midwives they are busy and they know what they are doing and they half expect you to. I think it probably comes after so many years of doing it, it's automatic pilot. (Issie, 31 years, Primip, BMI=29)

"Midwives are so short staffed at the moment and they have all these government guidelines, and they have to stick to it. Right, tick the sheet, right they are done, next. And I think it's too much" (Polly, 24 years, Primip, BMI=23)

It is well documented that booking for maternity care is lengthy process that requires midwives to carry out a number of assessments on pregnant women to establish the most appropriate plan of care (NICE 2008). And this may be why the women felt that their midwives were preoccupied with the task of completing the paperwork associated with booking.

The booking process includes obtaining information about women's health and obstetric history as well as providing information on diet and exercise, the screening services available and risks and benefits of such tests, options for pregnancy care, place of birth,

breastfeeding, antenatal classes and maternity benefits (RCOG, 2008b). This means that in a relatively short space of time women are being provided with a significant amount of complex information and thus it may be seen as beneficial to provide some of this in literature form, so that individuals can read about it in their own time and at their own pace. However for some of the women, it would appear that they may have found a one to one discussion with their midwife of greater benefit.

During the interviews several of the women said that they were aware of how busy their named midwife was and that they recognised that this made the midwife's job difficult.

"My midwife, I have only seen her for about 5 minutes and during that time she has got to answer her phone all the time, because there are so many people ringing her, and this is what it is like constantly for her!" (Polly, 24 years, Primip, BMI=23)

It was interesting to see how the women felt empathy for their midwife and in some instances felt the need to protect them for further stresses, which resulted in them feeling reluctant to add to their workload by asking questions.

"You go to your own antenatal appointments and you can ask whatever you want, but they are so busy and they have other things to do that I think there is not much support there for healthy eating, because they have got other things to do" (Martie, 32 years, Para 1, BMI=23)

"I think you are very aware that midwives are very busy and have loads to do, and at least this is one area now,[the EWKA programme] which perhaps could be made clearer so that you don't have to bother your midwife." (Jenny, 33 years, Primip, BMI=24)

This perception that their midwife would be too busy to be disturbed with their queries may have been a contributing factor in them agreeing to participate in the study and indeed how they responded to the programme. This can be seen in Jenny's response (above) where she felt that the intervention provided her with the support she needed and meant that she did not have to disturb her midwife for it.

5. 5. Discussion

This study has shown that a midwife-led intervention programme aimed at improving health behaviours which utilised Motivational Interviewing and goal setting was both feasible and acceptable to this sample of women with uncomplicated pregnancies. The vast majority of participants reported that the programme was effective in improving both diet and physical activity behaviours, although it should be noted that as this is self-report it is a subjective measure of efficacy.

The data regarding dietary and physical activity collected from the PFFQ & the PPAQ although limited, does provide an insight into these behaviours prior to the delivery of the intervention. Although the PFFQ does not obtain information relating to the quantity of food consumed, as portion size is assumed to be standard, it does give an indication of the frequency of foods consumed. Some of the messages regarding healthy eating in pregnancy appeared to be adhered to and this was most notable with the bread and cereal consumption where often participants reported opting for the healthier whole grain options, as well as dairy intake where lower fat milk was reported to be the norm. Fruit and vegetable intake should make up one third of the overall food consumed daily. Within this study it is apparent that vegetable intake especially green and leafy vegetables or root vegetables (other than carrot) were not frequently consumed by participants. Conversely energy dense snacks scored high levels of frequency. The results would indicate that the diet quality of participants could be greatly improved through increasing consumption of vegetables and decreasing the intake of less healthy snack foods.

There are several limitations to the PFFQ which need to be acknowledged. Firstly this is a self-report tool which means that reliable estimates of food frequency may be impaired particularly when it comes to foods that are considered to be 'healthy' or 'unhealthy' where overestimation or underestimation may give a less than accurate result (MRC 2009) . The questionnaire is also limited by the number of foods listed, although the PFFQ appears to be a fairly comprehensive list, there are notable exceptions. As already noted there are a number of vegetables not included within the questionnaire. Also pre-prepared meals (e.g. ready meals or convenience foods) are not listed, and may cause participants problems in trying to identify the foods contained within them. For example a shop-bought lasagne would include pasta, minced meat, cheese sauce and a combination of vegetables, yet it is doubtful that participants would be able to accurately record the components of this meal within this tool. Pre-prepared meals are one of the fastest growing sectors of the food industry in the UK (DEFRA., 2011) and

therefore consumption of these convenience foods is high, yet the PFFQ does not capture this data. The PFFQ has been used by other researchers to obtain more specific nutrient values by using databases that convert food frequency into total nutrient intake. However for the purpose of this study it has been used to assess diet quality in terms of the 'Eatwell' plate and dietary guidance contained within the Pregnancy Book (DOH, 2009d). The PFFQ has proved useful in obtaining an insight into the dietary quality of participants, and areas where dietary behaviour can be targeted to improve overall quality.

The data on physical activity gathered from the PPAQ prior to the intervention programme provided an insight into the weekly amount of physical activity expenditure of participants by various domains as well as intensity. The results showed a wide degree of variation of the total energy expenditure of participants. The mean total energy expenditure of participants was 253.52 MET-h°week (SD 161.65) and this figure is similar to that of other researchers measuring physical activity during pregnancy (Chandonnet et al., 2012, Wojtyla et al., 2012). When it came to the various domains, occupational activity accounted for 48% of total energy. However again there was a wide variation in scores of both these domains. At one end of the spectrum two participants were not in employment and therefore had a score 0 MET-h°week, whilst three participants had highly active jobs and scored >390 MET-h°week. The majority of participants had scores of <100 MET-h°week, ($n= 10$), with four scoring between 100-200 MET-h°week. With the vast majority of participants in employment, it is not surprising that most of their energy is expended during their work place. Other studies using the PPAQ have not found occupation to be the single largest contributor to overall physical activity scores. Research carried out by Chandonnet and colleagues (2012) in Quebec, Canada had significantly lower scores (occupational mean = 32 MET-h°week), however, the reason for this difference may be due to the rate of employment as less than 50% of their pregnant participants were working. Similarly, a Polish study (Wojtyla et al., 2012) using the PPAQ also reported lower proportion of the total activity expended as a result of occupation (mean score for occupation activity was 20 MET-h°week) . That study did not report participant employment characteristics and so it is not possible to know levels of employment, however they conducted their research in hospitals across Poland where they asked mothers who had recently given birth to complete the PPAQ. It would be reasonable to assume that occupational activity carried out in the weeks leading up to the birth of their baby would be far lower than that during early pregnancy, and therefore this may account for the differences in findings.

Guidelines for exercise during pregnancy advise women with uncomplicated pregnancies to aim for 30 minutes of moderate intensity exercise on at least 5 days of the week, the same guidelines as for the non-pregnant population (NICE, 2010d). However these levels were only achieved by 30% of participants in this study ($n=6$) and exercise accounted for only 3.8% of total participant energy expenditure. Suboptimal levels of exercise during pregnancy has been noted by other researchers (Borodulin et al., 2009), and this finding is comparable to the percentage of females in the general non-pregnant population in Wales meeting exercise guidelines (Welsh Government, 2010b). The finding from the previous longitudinal study with women, indicated that exercise was sometimes viewed as a negative health behaviour in pregnancy, it may therefore be expected that exercise uptake during pregnancy would be low. Midwives could be ideally placed to assist women to change this opinion and facilitate women to see moderate amounts of exercise during pregnancy as a desirable behaviour and this should include discussing the health benefits of exercise to both mother and baby.

Measuring physical activity levels through the use of self-administered questionnaires is a relatively inexpensive and straightforward method for obtaining data. It is also considered to have a low participant burden. However, there are a number of limitations. Firstly as with the PFFQ, it is subject to both recall bias and social desirability bias, where participants may either over estimate or underestimate physical activity. Secondly the tool captures data relating to occupational physical activity yet it does not take into account the number of working hours of participants, it assumes that if participants are in employment, they will be working full-time. Yet it is known that women, particularly those with children are often employed on a part-time basis (Alakeson, 2012). This may also account for the high proportion of energy expenditure recorded as a result of work found in this population. A possible alternative method of monitoring physical activity levels is the use of accelerometers which can be used to capture objective measures of activity, and this may be worth exploring in future studies. The results from the data gathered via the PPAQ demonstrate that the exercise behaviours of participants are not meeting current guidelines and this area could be specifically targeted to improve the overall health of pregnant women.

The theoretical underpinning for the programme of intervention was based upon a theory of personality development; Self Determination Theory (SDT). According to SDT motivation that guides behaviour is not a unitary concept that one either possesses or does not, but rather it should be viewed in terms of a continuum from the least through to the most self-determined form. The theorists suggest that self-determined behaviour can be fostered in an environment that supports the three fundamental psychological

needs of autonomy, competence and relatedness (Deci and Ryan 2002). Put simply, in order for behaviour change to be successful an individual must perceive it be volitional, doable, and have support to change from others. One might suspect then, that if the 'Eat Well Keep Active' programme was seen as successful by the participants, that SDT measurements taken prior to and following the delivery of the intervention would show an increase in participants sense of autonomy and competence in both diet and physical activity domains. As was noted previously, the timing of the intervention and questionnaires may lead to a change in scores over time. The first questionnaire was completed between 14-16 weeks gestation and the follow up between 20-24 weeks. Although the PFFQ and PPAQ both asked respondents to report on behaviour for the preceding four weeks, the SDT-HC pack was designed to catch a snapshot of motivation at the time of questionnaire completion. The common complaints associated with the first trimester (NVP and increased tiredness) usually subside by 12 weeks for the majority of people, although it is possible that a few women may still have been experiencing them. Therefore a detection of differences in scores may not be attributable to the 'Eat Well Keep Active' intervention but as a result of the decrease in these symptoms. If these common physical complaints experienced in pregnancy were indeed responsible for the changes in autonomy and competence scores over time, this could then be seen as providing further evidence of the deleterious effect of pregnancy on these psychological constructs as suggested by the findings from the longitudinal study.

The differences between the scores across the two domains of diet and exercise is interesting as it could be argued that the two domains would seem like natural bedfellows, after all they are often combined together as encompassing a 'healthy lifestyle'. Yet in this study they appear to be less well aligned. Perhaps this could be explained by the type of motivation behind these two behaviours. It could be argued that improving diet such as increasing fruit and vegetable intake could be viewed as enjoyable changes to make and unlike increasing physical activity does not require sustained regular exertion. Thus improving diet could be considered to be more intrinsically motivated whereas physical activity takes more of a sustained effort and may therefore be viewed as less enjoyable and as more extrinsically motivated behaviour. Exercise also requires a degree of time commitment: with many of the participants working, their sense of competence may have been reduced due to a lack of free time they perceived as being available to them to participate in exercise. Indeed other researchers have found lack of time to be the lead barrier faced by women when trying to maintain physical activity during pregnancy (Evenson et al., 2009).

Another possible reason for the difference between the results obtained for the two behaviours may be linked to the way they are perceived by participants in particular the effects of the two behaviours on the developing fetus. Diet is often seen as having a positive direct impact upon the welfare of the fetus; the maternal diet not only provides nutrition for the mother but also provides nutrition for the growing baby. However the same link may not be made with physical activity or exercise, and as was noted from study two, women associated exercise as being beneficial to an individual in the management of weight, but view it is potentially being detrimental to the growing baby.

The wording used within the TSRQ referred to 'exercise' and not physical activity, for example one of the items states: "The reason I would exercise is: because I feel that I want to take responsibility for my own health". Physical activity encompasses any action that involves movement of skeletal muscles (Caspersen et al., 1985) and therefore everyday activities such as housework, walking, or climbing the stairs is considered to be physical activity. Exercise is also a type of physical activity, but it is usually planned and purposeful and carried out with the intention to acquire or maintain physical fitness (Bouchard et al., 2012). Exercise is usually differentiated from physical activity due to the intention behind the behaviour. It is therefore possible that only using the term 'exercise' throughout the TSRQ may partly account for the lack of effect on perceived autonomy scores, and although many of the women included types of exercise as one of their goals, other forms of physical activity that could be easily incorporated into their everyday routine were also identified. If the wording within the TSRQ had included physical activity as well as exercise, this may have yielded different results.

The internal reliability of the scales contained within the SDT-HC pack showed a good degree of variation in reliability within the TSRQ with autonomous and controlled subscales scoring Alpha reliabilities of between α .65- α .87. However the amotivation subscale scored between α .011 and α .47. This would suggest then that perhaps the amotivation subscale is not measuring the same underlying attribute (Pallant, 2001). When applying the theory to this particular sample of women, one may expect to find low scores of amotivation; women are consenting to participate in a study designed to improve health behaviours, therefore by default those who agree to take part are likely to be motivated. And indeed half the sample had a history of dieting (see Table 30 page 352) and as such we can see that there is clearly historical motivation to pursue a healthy lifestyle. Yet when we look at scores for each of the three items we can see that the pattern of scores is very different. If all three items were measuring amotivation there should be a similar pattern for each one. However, although the majority of

responses for all three items would support the notion that the sample were indeed motivated, one item in particular had a much wider range of responses ('I really don't think about it'). If we explore this further it is conceivable that for a small minority, this item may have been tapping into intrinsic rather than amotivation. To explain this we could use an example of someone who eats a very healthy diet simply because she prefers it to an unhealthier one. When asked why she eats it, her answer may simply be 'I don't know, I just do'. Therefore she is not demonstrating high levels of amotivation but rather intrinsic motivation; she is consuming a healthy diet for no other reason than the simple enjoyment it brings. With such ambiguity within the items it is perhaps not surprising that one would have a wider spread of responses, and this then, may explain the low alpha scores. Furthermore as the amotivation subscale comprises only three items, Cronbach's alpha would be expected to be low and indeed many other researchers using the TSRQ have reported low scores for amotivation (Reed-Knight et al., 2011, Zoellner et al., 2011, Masse et al., 2006). It would seem that the amotivation items within the TSRQ is an unreliable measure for this population.

A limitation of the quantitative data gathered via the questionnaires is the small sample size, statistical power is therefore limited and therefore all quantitative findings should be treated with caution. However this study is an exploratory study with the primary aim of assessing acceptability and feasibility of the 'Eat Well Keep Active' intervention programme.

From the qualitative data gained from the interviews acceptability for the intervention was very high. Participants reported that they welcomed being included in the programme and the opportunity it provided to discuss both their diet and physical activity behaviours with a midwife. The women in this study reported that involvement in the programme was effective at improving their lifestyle behaviours, and although this is a subjective measure of efficacy it is none the less encouraging and may explain the unanimous acceptability of the intervention from all the participants who remained in the study. It is unlikely to be as warmly received if participants felt it made little difference to their diet and physical activity levels. The study by Claesson et al., (2008) which sought to gather the opinion of participants in their intervention trial also identified that involvement in their research had improved lifestyle behaviours and was perceived as beneficial, indeed their results demonstrated that their intervention significantly reduced gestational weight gain. However their intervention, unlike the 'Eat Well Keep Active' programme was a far more intensive intervention with participants required to attend weekly half hour long coaching sessions throughout their pregnancy as well as weekly exercise classes. Participation in their study required significant

commitment and time and may result in a selection bias as only those women who are highly motivated would take part given the significant participation burden. Also in the UK this level of intensity would not be viewed as cost effective, with NHS resources already overstretched (Warwick 2012), However it could be argued that a strength of the 'Eat Well Keep Active' intervention programme is that it could easily be incorporated into existing patterns of antenatal care, and therefore would be financially feasible. Participants responded positively to all three stages of the intervention (counselling, goal card and telephone call), and the only drawback to study inclusion that the women reported was the completion of the questionnaires, which they found to be laborious.

There was much evidence throughout the interviews that the intervention programme met the fundamental psychological needs of autonomy, competence and relatedness as set out by SDT. The women reported a strong sense of ownership of the goals set during the goal setting, and identified the generation of goals as coming from within them, addressing the areas of lifestyle that they felt were pertinent to them. The goals that they set themselves were relatively small achievable targets. Rather than having generic goals such as 'I will only eat healthy foods' or 'I will get fit' they tended to be more specific; 'I will swap my crisps for fruit or nuts' or 'I will take the dog for a ten minute walk every evening'. Literature around the psychology of lifestyle behaviour change is clear, when using goal setting as a technique it is important for participants to have a high level of confidence in their ability to achieve their goals (Davies, 2011) and doable goals is associated with an increase in self-efficacy (Rosenstock et al., 1988). By assisting participants in this study to set tasks that they believed were realistic and could be achieved, levels of confidence in their ability to change their behaviour appeared to be improved, increasing their sense of competence. The women reported how their needs for relatedness were met by having significant others supporting them in improving their diet or physical activity and specifically referred to the goal card as serving as a prompt for partners. It could be argued that the goals were valued by the partners because they had been developed with and endorsed by a health professional and therefore they had greater credence, though without the partner view point it is not possible to confirm this assumption. Research has identified the key role that the views of partners have on the health behaviours of pregnant women (Campbell et al., 2011). This is an area that should be looked at in any future studies, as obtaining qualitative data on partner's response to any health behaviour intervention programme may provide insight into the views and experiences of those

individuals with a key role in supporting and affecting behaviour change in pregnant women.

Several of the participants perceived their named community midwife as being a professional who was extremely busy and felt that as a result, appointments with her tended to feel rushed. Some participants wanted to have more contact with their midwife and voiced their disappointment that the schedule of appointments meant they only saw their midwife twice during the first half of pregnancy. The NICE guidance regarding pattern of antenatal appointments (NICE 2008), suggest that appointments should be 'determined by the function', and therefore can be limited to a total of 10 appointments during the course of the pregnancy for a nulliparous and 7 for parous women. However they acknowledge that this number of appointments may lead to a reduction in women's satisfaction with their antenatal care. The results from this study and study two would support this view. Early pregnancy (<20 weeks gestation) is often a time of great change, physically as well as psychologically for the expectant mum, leading some to have raised anxiety about their health and that of their growing baby (Da Costa et al., 1999). The universal approach to pattern of antenatal care as endorsed by NICE takes into account the cost effectiveness of service provision and clinical outcome but not necessarily the wider psychosocial needs of the individual, and would appear to be contrary to the 'woman centred' philosophy of care that it purports to hold. Therefore it is acknowledged that the acceptability of the intervention study may be due to the perceived increased healthcare professional support that inclusion in the study provided. This then, is a limitation of the study. It may be that acceptability of the intervention programme would be less if the intervention was delivered during routine antenatal appointments instead of supplementing the usual pattern of care, and any future studies should address this.

A further limitation of this study is that acceptability of the EWKA programme was assessed through one to one interviews conducted by the same person who delivered the intervention. Women participating in the study may have felt obliged to provide a positive response when asked about how they perceived the programme for fear they may offend me, as the individual responsible for its delivery; i.e. there may be social desirability bias. However, despite the women being positive about the programme, they did feel comfortable enough to criticise aspects of the study, namely the use of the questionnaires, and one participant did report that she felt her involvement in the study did not alter her health behaviours. One may feel that if participants had felt that they were unduly coerced into providing positive feedback of a programme that this would

extend to all aspects of participation including administration of questionnaires. It is acknowledged that this potential bias could have been minimised through ensuring data collection was conducted by someone other than the person responsible for the delivery of the intervention; however in this instance, due to the small scale of the study this was not possible. Instead women were encouraged to discuss negative as well as positive aspects of the programme (see interview schedule page 346), further I was mindful not to portray a vested interest in the acceptability of the programme towards the participants in a bid to minimise this possible effect.

The high levels of acceptability of the intervention may also be due to the design of the intervention itself. A core element to the intervention was the autonomy supportive environment and this could be seen most notably in the goal setting exercise where individuals were responsible for determining and setting their own goals. In having this degree of control over their planning, participants were encouraged to self determine their behaviour. Therefore when asking them how they felt about the goal setting aspect of the intervention it would be unusual for participants who, as has been noted, are already motivated to change to view this as being anything other than positive. Also, as was seen in the review of the intervention studies in chapter one (page 41), by simply providing someone with significantly more attention with the aim of improving their health behaviours, may positively influence the behaviour irrespective of the methods used. And as such, any subjective measures of efficacy should be viewed with this in mind.

It should be noted that part of the reason why participants may have found the intervention to be acceptable may be due to the personalities involved. As the individual responsible for development and delivery of the intervention, I was particularly interested in how the women perceived their diet and physical activity and their involvement in identifying individual goals. This meant that I demonstrated a deep interest in their health behaviours and their views. For some, having a health professional who was so clearly interested in what they had to say will have impacted upon how valued they felt their opinion was, and this in turn would have affected their view of the acceptability of the intervention. Of course a key element of the 'Eat Well Keep Active' programme is the interaction between woman and the midwife delivering the intervention as it is necessary for the woman to feel that the healthy goals were important, valued and therefore should be attempted. However, if a larger scale study was to be conducted with different personnel delivering the intervention, the same

enthusiasm that I displayed may not be shown by all, and so including the Health Care Climate Questionnaire in a larger trial may provide interesting results.

The design of this research means that this study may have been subject to selection bias. Pregnant women fitting the criteria were invited to take part in this research, and those individuals who consented to participate may have agreed to do so because they were already motivated to be as healthy as possible. It is likely that potential participants who did not wish to make lifestyle behavioural changes would not have agreed to take part. Therefore the acceptability of this intervention may be less in those women who are reluctant to consider dietary or physical activity behaviour change.

Unhealthy dietary and physical activity behaviours are not limited to pregnant women but are recognised as being an issue to the population as a whole. This brief intervention which comprised motivational interviewing and goal setting appears to be both feasible and acceptable to this sample of healthy low-risk pregnant women and could easily be incorporated into the existing antenatal service provision delivered by community midwives. Information regarding diet and physical activity behaviours during pregnancy should already be included as part of the standard antenatal care given by midwives which encourages healthy lifestyle behaviours (NICE 2008). This intervention changes the way in which this is conducted from women being given standard information to a more individualised woman centred discussion that puts the woman's needs and views at the centre. It may be considered that this would be an expensive intervention to roll out to maternity services as it would require training of midwives in the use of motivational interviewing, and this is a very valid issue in the current health climate of reduced budgets. However in September 2011 (three months after the data collection for study three was complete), the publication 'The strategic vision for maternity services in Wales' was released by the Welsh Government (Welsh Government, 2011b). This document identified 5 key themes for the maternity provision in Wales including the promotion of healthy lifestyle behaviours during pregnancy. It recognised that appropriate training in public health skills of health professionals was required and gave a proposed performance measure as being the "percentage of midwives trained in Motivational Interviewing" (Welsh Government, 2011 p.12). As a result of the strategy document a pilot programme of Motivational Interviewing training for midwives is underway across all health boards in Wales and is currently being evaluated (NISCHR & CYPRN, 2012). If this training were to be rolled out to all midwives as is proposed by the Welsh Government, the 'Eat Well Keep Active' intervention programme would have minimal training implication costs and it would

therefore be feasible to implement into the existing maternity service. Further research is required to assess more objective measures of efficacy of the intervention in altering and improving the dietary and physical activity behaviours of pregnant women.

5. 6. Applying Motivational Interviewing – a reflective account

In midwifery and nursing, the benefits of reflective practice have been widely documented (Taylor, 2000, Hansom and Butler, 2003) with reflection being seen as an important part of the continuing professional development of midwives (Yearly, 2003). Reflexivity is also seen as an essential tool in qualitative research (Finlay and Gough, 2003) as researchers need to acknowledge their own experiences and role in the process and outcome of inquiry (Finlay, 2003). And so in this section, I intend to explore my experience as researcher and a midwife delivering Motivational Interviewing.

As a practising midwife I am aware of my role in the promotion of healthy lifestyles to pregnant women. For the majority of my career, this health promotion has predominantly been in the form of health education, where I, as a midwife have talked to women about the overwhelming evidence that demonstrates the importance of pursuing a healthy lifestyle- i.e. I have told women what the recommendations are regarding health behaviours, and I have told them that having an unhealthy lifestyle is detrimental to their health and that of their developing baby. By providing women with all the information I believed that I was able to assist them to make an informed choice. Any discussion I had with women, be that about their diet, exercise or other health behaviours such as alcohol consumption and smoking tended to be one-sided: they listened whilst I educated. During these interactions with women I saw myself as the health professional with expertise in childbearing and so therefore believed I had 'authoritative knowledge'.

However, when I started to learn and explore behaviour change theories and received training in Motivational Interviewing, my practice and way of thinking was challenged. In order to facilitate behaviour change, more was required than simply providing information. After all "insight alone does not necessarily bring about behaviour change" (Prochaska et al 1992 page 1113). Indeed, Motivational Interviewing taught me that I

was not the one with authoritative knowledge, the person who knew the most about their behaviour and their reasons to change that behaviour was the individual (Miller and Rollnick, 2002). And when discussing behaviour change with women, if it was I who was voicing the reasons for change, the pregnant woman would be more inclined to feel defensive and more likely to voice the reasons for continuing the behaviour. So it became apparent that not only was my usual approach ineffective, it may have actually served to undermine rather than facilitate behaviour change. Motivational Interviewing, although a stark change from the usual 'provider-driven advice' approach, made sense to me. Especially when I applied it to my own situation. When I felt ambivalent about a behaviour, being 'told what to do' by someone else (even if they meant well) made me stubbornly resistant to their suggestions and resentful of their interference. Therefore this style of 'counselling' appeared to offer a new way of practising that was potentially more effective but also more 'woman-centred'.

The four guiding principles of MI; roll with resistance, develop discrepancy, express empathy, and support self-efficacy seem deceptively simple and although I could see the value of Motivational Interviewing when discussing behaviour change, I was mindful that applying the theory to practice was a different matter. The MI training taught me to sit and listen and evoke woman-centred concerns through open questions and reflective listening. It also taught me to avoid the confrontational directive approach which I was so accustomed to taking.

During this study, occasionally, when delivering the intervention I would find that a participant would display a strong resistance to alter their behaviour. At first, the temptation to confront their negativity by providing further reasons why they should change was strong, and would be likely to result in them voicing more resistance to change. Therefore when I encountered resistance I, as suggested by Miller and Rollnick (2002), tried to 'roll with resistance' and use it as a prompt to change the direction of the session and in doing so quell the defensive response. This was not always straightforward because it was easy to slip into the usual and comfortable provider driven advice. And so from the outset one of the hardest challenges I faced in delivering MI in practice, was to 'roll with resistance' rather than to challenge it. I suspect that other midwives would also find this aspect of MI equally challenging. I have thought about why this may be and believe it to be about what attracts particular individuals to the midwifery profession. Many enter into midwifery with a desire to actively help and care for women, and to promote their health and well-being. And so when we encounter someone who appears to be making the 'wrong choice' regarding

their lifestyle behaviour we are inclined to say “No. don’t do that! Do this”. As health professionals we want to help them see the error of their judgement and prevent them from harm. Yet Motivational Interviewing is about eliciting behaviour change through resolving ambivalence and it is argued that telling someone what they should do and how they should do it only serves to prevent them from achieving that resolution. And so MI or more specifically the guiding principle of ‘rolling with resistance’ challenges our desire to ‘correct’ negative health behaviours through arguing for change.

Within MI reflective listening is used as a tool to deliver two of the guiding principles; to develop discrepancy and demonstrate empathy. Providing an opportunity for the individual to discuss the pros and cons of a behaviour without feeling the need to defend it results in an open and frank dialogue. It is argued that reflecting back a person’s ambivalence in a non-judgemental way helps them to see that there may be a discrepancy between their behaviour and their own goals. When using reflection in MI I found there to be a temptation to overstate the cons of the behaviour, and even what may seem to be a simple reflective statement can be weighted negatively. For example “I understand that being healthy is important to you because you want the best for your baby but you enjoy eating chocolate and don’t want to give it up.” I found that achieving the balance when reflecting the pros and cons of a behaviour was not easy. However being mindful of the choice of conjunction that I used between the two ideas or views went a long way to address this. Using conjunctions such as ‘but’, ‘however’ or ‘although’ emphasises the contrasting relationship between the two and usually lessens the effect of the first in favour of the last (e.g. You enjoy eating fruit but chocolate is fantastic). Instead I found that simply using ‘and’ as the conjunction did not emphasise one view over the other and therefore when reflecting I was able to achieve more of a balance between the two views.

I expressed empathy in many ways, not just through listening and reflecting back what I understood them to have said, but also through my body language and my tone of voice, making it clear that I was interested in what they had to say. Expressing empathy was an easier element of MI and one which, in theory, midwives should be able to demonstrate. Although empathy is not included in the code of conduct (NMC 2008) it has been suggested that empathy is a core characteristic of a caring midwife (McKenna et al., 2011). Midwives who are empathetic are able to show that they understand the experiences, concerns or views of the individual. In MI expressing empathy demonstrates that the client’s perspective has been understood. I found expressing empathy was something that came naturally, women’s experiences were

something that I could easily relate to and suspect that this was in part, down to the behaviours that I was investigating. If I were to be using MI to explore illicit drug use in pregnancy, being able to 'put myself in their shoes' may have been more challenging as these are not my personal experiences. However, feeling ambivalent about limiting energy dense snacks and commencing or maintaining a programme of exercise is something I have felt, and suspect that this is a common experience for the majority of midwives¹⁸.

The final guiding principle of MI is that of supporting self-efficacy, and so instilling in women a sense of confidence in ability to change behaviour is key to its success. For the intervention this was mostly achieved during the goal setting exercise. The goal setting was a collaborative process where I assisted the women to develop their own goals rather than developing and assigning them myself. The women were encouraged to set goals that they believed they could achieve. In order to do this the goals needed to be realistic and specific. Setting goals that would be too challenging may result in failure and a knock to self-efficacy, whilst goals that were too easy may have little effect on behaviour and reduce motivation to maintain the behaviour (Locke & Latham 2002). One of my participants reported eating up to five packets of pickled onion crisps a day, every day. If she had set herself the goal of limiting this to only four packets a day, although an improvement on her current consumption, it was still far from ideal. Instead she set her goal as no more than two packets a day, which she felt to be achievable. And indeed when I followed her up she reported that she had achieved and surpassed her goal and often went days without a packet. Prior to my MI training I might have been inclined to advise her to stop eating the crisps altogether, after all they have little nutritional value, a high fat and salt content. However this would have been an authoritative stance that is not in the 'spirit of MI', and had she failed to stop this could reduce her sense of self efficacy. So by guiding her to set her own goals she developed a goal that she felt able to achieve, and building on this self-efficacy she was able to surpass her original goal.

Providing feedback to achievement of the goals is thought to be an integral component of successful maintenance of behaviour (Locke & Latham 2002), further supporting self-efficacy. Feedback was given during the follow-up phone call. From a personal perspective it was nice to catch-up with the participants and it satisfied my curiosity to find out how they had been getting on with the goals they had set themselves. I was at

¹⁸ Indeed it takes a good deal of will power and restraint not to consume the endless amount of chocolates and other confectionary so frequently donated to ward staff by grateful patients and their families or to make time for a run or a swim after a busy twelve hour shift!

first anxious that the participants may feel that I was being a nuisance or even harassing them. However I found that all the participants were keen to share their experience, and their sense of pride in their achievements was obvious. When they mentioned goals that they had not been so successful in achieving I was able to encourage them to talk about how they felt about barriers to change and help them make plans to overcome the identified barriers, further increasing their sense of self-efficacy.

I found the simplicity of Motivational Interviewing to be misleading. My experience of using MI has shown that it takes concerted and determined effort to diverge away from the more usual and traditional role of 'health educator'. Although there has been increasing emphasis on the role of the midwife as a public health practitioner, research has shown that in practice midwives deliver health education rather than health promotion (Lee et al., 2012), and my experience as a midwife would support this. However, I was able to adapt from that default position and deliver Motivational Interviewing appropriately in a way that supported women's autonomy without falling into the trap of directing women to change. My experience would suggest that with time and commitment midwives can adapt their current practice to include using MI as a means to facilitate behaviour change.

CHAPTER 6.

SYNOPTIC DISCUSSION

The overall purpose of this research project was to explore both the clinical and personal management of gestational weight gain and to discover how women could be best supported to maintain physical activity and healthy behaviours during pregnancy. This chapter will explore the commonalities and variance of the three separate but related studies and discuss what the implications are for clinical practice, policy, education and future research. Firstly the key findings from each of the studies will be discussed.

6. 1. Summary of main findings

This thesis started with a critical review of the literature regarding childbearing women's weight and their gestational weight gain, looking first at the context of overweight and obesity in the non-pregnant population. It is now widely accepted that overweight and obesity in the UK is prevalent and places an increasing burden on the National Health Service due to the co-morbidities associated with a raised BMI (McPherson et al., 2007). Preventing or reducing rates of overweight and obesity is therefore of primary concern for the British Government (DOH, 2008). Pregnancy had been identified as a key time in the development of overweight (NICE, 2006) and may be viewed as a time when women may be especially receptive to health promotive messages in the desire to ensure their growing baby has the best start in life. However in the UK there are currently no clinical recommendations regarding gestational weight gain and instead women are advised to consume a healthy balanced diet and to maintain regular physical exercise.

Study One was concerned with the current clinical advice and support being given to women across Wales with regards to their weight gain and specifically their dietary and physical activity behaviours. Given the current focus on overweight and obesity in maternity, this study also explored the provision of specific care and advice for women with a raised BMI. Antenatal Clinic Managers ($n=11$), who were all qualified midwives,

from five of the six eligible Welsh Health Boards were recruited to take part in semi-structured interviews.

At the time of interviews all the participating units had protocols in place for the weighing and measuring of all pregnant women at or close to booking for maternity care as per NICE Guidance, with those identified as obese being referred for obstetric review. There was a great deal of variation across the Health Boards with regards to other services for obese women such as referral to dieticians, anaesthetists and specialist midwives due to the limited availability of these professionals. Thematic analysis of the interviews identified four overarching themes: Stretched resources, Knowledge, Communication & support, and Weight & vulnerability and a subtheme of Risk. The midwives reported that, due to the increase in the number of pregnant women booking for maternity care with raised BMI, the services and resources available were limited, resulting in the need to renegotiate criteria for referral. This was based not upon the needs of the individual but on the limited availability of services and provides an insight into how the rise in obesity rates in the pregnant population impacts on maternity service provision.

It was evident that the ANC midwifery managers saw pregnancy as an ideal time to address lifestyle behaviours due to women's increased motivation to pursue a healthy lifestyle for the benefit of their developing baby. However many felt there were barriers that prevented them from addressing the topic of diet with pregnant women including: a perceived lack of nutritional training, fear of offending women, and issues with their own weight. Also in the absence of clinical guidance, midwives lacked confidence in giving advice to women regarding appropriate weight gain in pregnancy. On the other hand the midwives appeared to be more confident in discussing exercise which may be due to it be viewed as a less sensitive area for discussion than either diet or weight. It was apparent that not all of the midwives were familiar with the recommendations for exercise in pregnancy and several of them referred to exercise in terms of the risk it may pose rather than the benefits to women's health. Indeed risk was a recurring theme throughout the interviews and may reflect what is increasingly being called a 'risk centred' culture in maternity care (MacKenzie-Bryers and van Teijlingen, 2010).

Although the ANC midwifery managers reported that women were especially open to healthy lifestyle messages, in the absence of gestational weight gain guidelines and with an emphasis on risk in maternity perhaps it is unsurprising that participants in this study reflected a degree of anxiety and lack of confidence in discussing weight management with women.

The ambivalence noted by the midwives appeared to be reflected in the experience of interactions between women and midwives reported by the participants in **Study Two**. This longitudinal qualitative study sought to gain an insight into women's views and experience of gestational weight gain, with participants ($n=15$) being interviewed early in their second trimester and followed up six weeks following the birth of their baby. Analysis of the interviews resulted in five overarching themes; Information and advice, Managing weight gain, Goals and barriers, Listening to the body and Needs of the baby. As with Study One the topic of 'Risk' was prevalent during the interviews and therefore was included as a subordinate theme. The participants in this study reported minimal discussion with their midwife regarding their diet or physical activity other than advice regarding the avoidance of foods and exercise known to be harmful to their developing baby. Several women reported that they felt there was a lack of contact with their midwife in early pregnancy, at a time when they felt that they had many questions regarding their lifestyle behaviours and felt especially vulnerable. In the absence of advice from their midwife the women would seek out other sources of information commonly family, friends and also searching on the internet. However, the women recognised that these other sources of information should be treated with caution.

There was a degree of ambivalence also noted within the study data regarding views on weight gain in pregnancy. Some participants welcomed pregnancy as a time of freedom to no longer worry about trying to stay slim, whilst others found the prospect of their increasing size alarming. Although the majority of women in the sample were anxious to not put on excessive amounts of weight, this didn't appear to impact upon their consumption of unhealthy, energy dense foods and there was a general view that any extra weight they did put on through the course of their pregnancy could be addressed after the birth. Therefore for some, pregnancy was not viewed as an appropriate time to be managing their weight gain.

The women were highly motivated to make some changes to their behaviours to benefit their growing baby. With regards to the dietary changes they intended to make, avoidance of foods that were considered unsafe and increasing fruit and vegetable intake were deemed as important. Limiting the consumption of energy dense snacks was not regarded as desirable as this appeared to be affiliated with weight loss and dieting. The majority of women reported they intended to attend 'pregnancy specific exercise classes' but exercise other than this was viewed as potentially detrimental to their baby and therefore to be avoided. In the follow-up interview none of the women attended the exercise classes as planned and reasons for non-attendance related to

the timing, and availability of the organised classes. Although these women were overweight and obese class I, they were still considered to have healthy, low-risk pregnancies and as such were allocated to receive midwifery led care (MLC). They were therefore in receipt of the same standard care as those women who were a healthy weight at booking. Despite confirmation from the maternity service that they were suitable to receive MLC, evidently the women viewed themselves as especially vulnerable to harm and were anxious not to put their baby at risk.

A number of barriers other than risk were identified by the women that thwarted their good dietary and physical activity intentions. These included tiredness, nausea, food aversions and cravings as well as lack of time and financial constraints. The women frequently reported 'listening to their body' which appeared to manifest itself as the need to follow internal drivers and impulses such as food aversions and cravings without the apparent ability to stop even when they knew these impacted upon the quality of their diet. It could be seen that the physical state of pregnancy seemed to have an effect on their body which reduced their sense of control or autonomy and so their self-efficacy and this has been identified in the feminist literature (Johnson 2010). With their perception of control and self-efficacy being low and in the face of barriers it is not surprising that the women in this study were unable to achieve their healthy lifestyle goals.

When it came to making decisions regarding their lifestyle behaviours during pregnancy, it was noted that there was a conflict of interest for some women who saw their own needs (such as limiting their weight gain through altering their diet and exercising) being at odds to that of their baby's (which required them to avoid both dieting and strenuous exercise). However, those women who noted this juxtaposition would clarify that their developing baby's needs took precedence over their own. It would seem that this position may be viewed as further undermining their sense of autonomy as their behaviour was being controlled by their baby's needs.

There are physical, social and psychological aspects which are known to influence an individual's motivation to change behaviour, and significant life events can provide an important opportunity for intervening (NICE, 2007). Pregnancy is viewed as one such opportunity, where a woman's motivation to improve her health behaviours may be particularly strong (Phelan 2009). However, the results from study two highlighted that pregnancy as a life stage can be viewed as particularly challenging with psychological constructs such as autonomy, self-efficacy, and social environment being especially influential on women's behaviour. Yes, the women in this study demonstrated a strong

motivation to follow a healthy lifestyle. However the manifestations of pregnancy, common complaints and fear of harm all interfered with their confidence in their ability to determine their behaviour. The perception of the fetus as being especially vulnerable to harm as a result of a change in behaviour meant that many women preferred to wait till after the birth in order to address their diet and physical activity. Partners, family and friends were a source of support and advice which appeared to shape their behaviour. Observing other women's experience of pregnancy was also seen as influential in determining behaviour

The question then, is can an intervention be developed that will promote women's autonomy and facilitate them to attain the healthiest lifestyle behaviours during pregnancy? **Study Three** looked at the acceptability of an intervention which attempted to address this.

The final study adopted a mixed methods approach to assess acceptability and feasibility of the 'Eat Well Keep Active' intervention programme. This programme was informed by the two preliminary studies and based on Self Determination Theory (SDT). The intervention was designed to provide the women with a supportive climate with which to promote their fundamental psychological needs of autonomy, competence and relatedness as identified by Deci and Ryan (2002). Thus not only was it possible to assess the acceptability of the intervention through one to one interviews, but also using validated psychometric scales the applicability of the SDT model to promote behaviour change during pregnancy could also be preliminarily tested.

Data relating to diet and physical activity behaviours of participants prior to the intervention was collected through two questionnaires which provided an insight into their eating and activity patterns at baseline. It was evident that their diet quality could be greatly improved through increasing fruit and vegetable intake and reducing the consumption of energy dense snacks. The majority of participants were also not managing to meet the recommended exercise guidelines for pregnancy.

Pre and post intervention measures collected data on the psychological constructs via the HC-SDT pack to analyse the effect of the intervention on participant's sense of autonomy and competence. It was predicted that if the 'Eat Well Keep Active' programme was successful autonomy and competence scores for both diet and physical activity would increase following the delivery of the intervention, and indeed this was found to be the case. It should be recognised however that the increase in autonomy and competence scores may be due to a decrease in NVP symptoms and

tiredness which are both known to lessen as the pregnancy progresses. The results of this study found that only the increase in autonomy score for diet was deemed to be significant and this may be due to the differences in the way the two behaviours (diet and physical activity) are viewed by participants as the insights from study two suggest.

The results from the qualitative data support the hypothesis that the 'Eat Well Keep Active' programme was successful in facilitating women to improve their dietary and physical activity behaviours. However, it is recognised that this was a subjective and not objective measure of behaviour change. It was evident that acceptability for all aspects of the intervention was high with participants welcoming the opportunity to discuss their lifestyle behaviours with a midwife. There was evidence during the interviews that the intervention programme provided an environment that met the three psychological needs as defined by Deci and Ryan (2002). That is, it supported women's autonomous decision making, perception of competence and provided direction with regards how best their partner could support them to achieve their behavioural goals.

6. 2. Meeting the study aims and objectives?

The aims of this research project was threefold; firstly to obtain an overview of the current antenatal service provision in Wales relating to weight and weight gain with emphasis on the advice and services being provided. Secondly it sought to explore women's experience of weight gain during pregnancy through investigating diet and physical activity intentions and reported behaviour. The third aim was to develop and evaluate an intervention to promote and improve pregnant women's lifestyle behaviours informed by the two preliminary studies.

The results of the scoping study demonstrated the variation in Wales of the provision of services for women with regards to their weight and weight management. The study succeeded in highlighting a number of areas of interest and demonstrated the key issues in providing adequate support for healthy lifestyle behaviours in pregnancy as identified by midwives.

The longitudinal study explored the experience and intentions of overweight women regarding their lifestyle behaviours, and provided clarification of the issues that many

women face when trying to pursue healthy dietary and physical activity behaviours in pregnancy. The results from this study supported those from the scoping study and also highlighted potential for improvement of midwifery care. Further analysis provided insight into the core psychological constructs that were involved in shaping motivation and regulation of behaviour during pregnancy.

The intervention study tested the feasibility and acceptability of the novel 'Eat Well Keep Active' intervention on a sample of low risk healthy weight and overweight women. This study achieved its aim and provided evidence that the midwife-led intervention based on Self-Determination Theory and developed in light of the findings from the preliminary studies was indeed feasible and was found not only to be acceptable, but was also welcomed by the participants. Theoretically designed interventions that can facilitate women to pursue healthy lifestyle behaviours during their pregnancy are lacking and 'Eat Well Keep Active' has the potential to address this. Further research is needed in order to assess the acceptability of the intervention to midwives and other groups of pregnant women, prior to assessing its efficacy in changing and maintaining healthful behaviours.

6. 3. Limitations and strengths

Several limitations to this programme of research need to be acknowledged.

Firstly these three studies were predominantly qualitative studies and accordingly had small sample sizes, therefore the findings cannot be generalised. However the interviews with the Antenatal Clinic Managers in Study One had representation from all Health Boards except one and as all maternity units within an LHB shared the same protocols it was possible to obtain a clear impression of the nationwide policies and protocols regarding weight and weight management for pregnant women.

The self-selected nature of study participation means that results from the two studies involving services users must be interpreted in the light of that knowledge. Participants in both Studies Two and Three reported dissatisfaction in the amount of contact they had with their named midwife during the first half of pregnancy. This dissatisfaction in the pattern of antenatal appointments may be due to a bias in the sample as, if women already perceived there was a lack of midwifery contact then they may have been much more willing to participate in a study which would provide additional one-to one time with a midwife (albeit a midwifery researcher).

It is also possible that those women with a particular interest in maintaining a healthy lifestyle will have been more motivated to take part in a study investigating aspects of health behaviour than those with little interest in this area and as such these studies may be subject to sampling bias. Also social desirability may have affected the responses that participants gave. Women may have over-emphasised the importance they placed on healthy eating due to a perception that this was what was expected of them, especially in the knowledge that I was a midwife. However, it should be noted that several women appeared to be frank and open in their responses, often disclosing that they had consumed foods that would be considered unhealthy such as foods high in fat and/or sugar, which suggests that not all participants felt the need to provide a socially desirable response.

Participants in all three studies were aware of my profession as a practising midwife and although I made it explicit that my role during recruitment and data collection was that of researcher, it should be acknowledged that my profession may have affected the responses given by participants. A researcher who did not have a background in midwifery might have had a different experience. However this was also strength as my professional background served as an advantage in recruitment where I was familiar with the processes involved in antenatal clinic and potential participants appeared to be open to the prospect of research conducted by a midwife. There was a potential for conflict of roles between that of midwife and researcher as noted by others (Ryan et al 2011), but this was discussed at length during the LREC meetings for studies two and three. It was confirmed that notifying potential participants of my profession was appropriate but that should queries arise that related to their clinical care women should be referred back to their named midwife. However when it came to simplistic questions which were deemed not to affect clinical care (such as 'when and where will I have my next scan?'), these were answered appropriately, but I did not provide any antenatal care to participants during my role as researcher. Recruiting participants and collecting data was not carried out during my employed hours as a midwife which meant I was able to wear smart clothes, and not my uniform, thus clearly differentiating my role to that of researcher, not midwife.

As highlighted in the previous chapter, it could be argued that a further limitation to the final study could in fact be my involvement as the sole individual responsible for the delivery of the 'Eat Well Keep Active' intervention. I am aware that I may have personally enhanced the acceptability and therefore efficacy of the final intervention. That is, the intervention was not delivered 'in a vacuum' but was likely to be influenced

by the way in which it is introduced and discussed with participants. And although built into the intervention is the clinician's belief in the pregnant woman that she is indeed capable of achieving change; whether other midwives delivering the intervention are able to demonstrably achieve this, remains to be seen.

A genuine strength to this programme of research is the combination of the three separate studies. In obtaining the views of both services users and providers with regards to weight, diet and physical activity during pregnancy, a comprehensive picture of these behaviours was achieved. It was possible to explore the variance and commonalities and to investigate facilitators and barriers that both groups faced in managing dietary and physical activity behaviours during pregnancy. These preliminary studies then provided a sound basis for the development of the final intervention study, which took into account the motivations and barriers identified by both the midwives and the women. Thus this tripartisan approach has proved to be advantageous.

6. 4. Integration of findings

Although the three studies are related in that they explore the clinical and personal management of gestational weight gain, they are three separate studies with three different and distinct samples and therefore there are limits to what can be inferred when attempting to combine the findings. However commonalities were noted between the studies.

There were several common themes that have been identified across each of the three separate studies. Firstly it was confirmed that both health professionals and women alike believe pregnancy to be an ideal time to make changes to lifestyle behaviours as there was an increased motivation to improve health to benefit the developing baby and this finding is supported by other research in the area (Phelan, 2009b). This congruence between service users and professionals is a welcome finding as it suggests that it should facilitate change. Secondly there were numerous barriers that were identified that prevented midwives and women from tackling the issue of weight gain. Similar to earlier studies involving midwives (Heselhurst et al., 2012, Olander et al., 2011) , the Antenatal Clinic Managers felt reluctant to discuss managing weight gain due to an absence of clinical guidance in this area and felt they lacked the knowledge, skills and therefore confidence to provide appropriate advice. This finding was reflected in the longitudinal study with women who reported that discussions with their midwife regarding their diet were lacking in advice regarding healthy lifestyle

behaviours and weight management, leading them to seek this information from other, less trusted sources. Moreover when it came to exercise the NICE (2010) recommendation for pregnant women was not being promoted and commonly both the women and the midwives identified that pregnancy was not considered to be a safe time to commence a programme of physical activity.

The discourse of both midwives and women regarding weight, physical activity and dietary behaviours appeared to be underpinned by the concept of risk. It is widely accepted that increasingly maternity services are being governed by risk avoidance (MacKenzie-Bryers and van Teijlingen, 2010), and this would appear to be evident in the way these health behaviours are viewed by midwives and in turn the women for whom they care. With healthy well women viewing their pregnancy as being a risky situation with the potential for harm to their baby, it is unsurprising that they were reluctant to make large alterations to their lifestyle behaviours other than those they viewed as being 'safe'. In the absence of discussion with their midwife regarding their diet and activity levels and what may be viewed as appropriate and healthy, women preferred to keep the status quo and thus address any issues regarding their weight after the birth of their baby.

It was interesting that the women in Study Two placed an importance on the need to avoid food known to be unsafe but did not avoid those foods viewed as being high in fat and/or sugar. Indeed avoiding energy dense food was affiliated with weight loss and therefore something to be avoided in pregnancy and this appeared to be a novel finding. I would argue that if health professionals were to explore with women their perception of what constitutes a healthy diet, this myth that limiting energy dense snacks was considered to be equivalent to 'dieting' could be dispelled. Instead eating for health (rather than to avoid disease), could be promoted, leaving the women confident that changing their behaviour would be of benefit. The universal midwifery advice which merely recommends that women should 'eat a healthy diet', does not seem to encourage women to explore their own diet and see how its quality could be improved and appears to be far from the woman centred approach so advocated by the profession.

The midwives in Study One felt that additional training and clinical guidance was needed in order for midwives to provide appropriate advice to women regarding weight management. However, the simplicity of the EWKA intervention means that midwives are not required to learn more about nutritional and physical exercise guidelines in order to tell the woman what she should do. Rather it is built upon the premise that the

individual with expertise in their lifestyle behaviours is the woman herself. She knows what areas of her diet and physical activity behaviours could be improved and reflecting this back to her allows the woman to see the important changes she can make to have a healthier lifestyle. This woman-centred approach means that the individual can see that making changes to her diet and physical activity behaviours is not only safe but it is desirable. This should reduce her sense of anxiety whilst giving her confidence to improve her health behaviours and this appeared to be reflected during the interviews;

“It’s a really nice idea to give women this piece of mind. To talk about their concerns about their diet, and fitness as well, during pregnancy. So I think it’s been really helpful... I think it motivated me to make the changes that I needed to make.” (Toni, 31 years, Para 1, BMI=26).

6. 5. Contributions to knowledge

The studies contained within the research project contribute to the increasing evidence regarding gestational weight gain and lifestyle behaviours in pregnancy. Prior to this research, little was known about how maternity services approached weight management in Wales. The scoping study involving all bar one of the large maternity units from each of the relevant Local Health Boards in Wales thus provided a comprehensive overview of the local policies and protocols. New evidence regarding the commonalities and variation in the provision of services for women with regards to weight and weight management was found. Minimal provision of services were identified for women wishing to have assistance to manage their diet and activity levels. The scoping study has added to the growing body of evidence (Olander et al., 2011, Heselhurst et al., 2012) that suggests midwives encounter a number of barriers when discussing the management of weight gain with women.

The longitudinal study is one of only a few studies that was found to have explored women’s views and experience of gestational weight gain, and therefore its findings further contributes to this evidence base. Discrepancies in what women viewed as constituting a healthy diet were discovered and some misconceptions created a barrier to healthy eating, this appears to be a novel finding. Exercise being viewed as potentially harmful to the developing pregnancy adds to the number of barriers which women faced when considering making healthful changes to their lifestyle behaviours.

Research exploring the psychological constructs involved in the dietary and physical activity behaviours of pregnant women is clearly limited. The findings of this sample therefore provide new insights into the influence that pregnancy has on motivation and regulation of behaviour.

Although several intervention studies targeting dietary and physical activity behaviour of pregnant women have been reported, there is a scarcity of theoretically driven interventions that seek to tackle behaviour change in this population. Therefore the 'Eat Well Keep Active' intervention study should be seen as an important addition.

A key contribution to knowledge could be seen as being my experience of delivering the Motivational Interviewing and the challenge of applying this in my interactions with participants. As was demonstrated by the reflective account in Chapter 5 (page 245), applying Motivational Interviewing in practice was not a straightforward process as my usual practice of health promotion has predominantly been in the form of health education and as such the most taxing aspect was to suppress the directional approach that I had in the past, so frequently adopted. However, over time I was able to adapt to the MI style and found it to sit comfortably with my wish to provide 'woman-centred care'.

6. 6. Implications for future research

This programme of research exploring women's management of dietary and physical activity behaviours in pregnancy has much potential for future research. An obvious starting point would be to do a larger scale study incorporating the 'Eat Well Keep Active' intervention programme into existing antenatal care delivered by community midwives. This then would address some of the limitations identified in study three. Outcome measures for this study should include objective measures of behaviour change where possible, such as monitoring fitness levels of individuals, although objective measurements of diet are not available and so it is usual to rely on self-report. Ideally the delivery of the intervention by midwives could be evaluated through the use of the MITI code to gauge treatment fidelity for Motivational Interviewing. Any such trial should also assess the acceptability and efficacy of the intervention by those midwives delivering it, as this is likely to affect the manner in which it is delivered and may impact upon efficacy as a midwife who believes the intervention to be a waste of time is unlikely to demonstrate a belief in her client's ability to change. This could be achieved

through conducting either focus groups or one-to-one interviews with participating midwives and would provide valuable feedback on clinician's view of the utility of such an intervention. Study 3 sought to assess feasibility and acceptability of an intervention delivered to a sample of low risk, white women who were predominantly middle class and as such acceptability of the intervention may not be universal as it may be limited to this subgroup. Therefore any future intervention studies would need to explore its acceptability to other pregnant subgroups (i.e. those with BMI >30, women from minority ethnic groups, teenagers, women from areas of high deprivation etc).

The intervention study conforms to phase two of the MRC Framework for complex interventions and therefore the next step should be a definitive large randomised trial with appropriate controls and increased sample size calculated to give statistical power, this then would allow for greater understanding of the efficacy of the intervention.

The tools used for the EWKA intervention could also be adapted for other health behaviours in pregnancy such as tobacco and alcohol consumption as well as substance misuse and this may be an area worthy of further exploration.

Further research might also explore adapting the intervention for promoting breastfeeding. Research has identified that there is a mismatch between the expectations of women and the provision of breastfeeding support by midwives and it has been suggested that developing breastfeeding instruction should be informed by motivational constructs (Stockdale et al 2008). Therefore a future study investigating the use of an intervention to promote and facilitate breastfeeding; where midwives could provide appropriate support to build on women's motivation, confidence, and perception of self-efficacy in a way that promotes their autonomy, may prove to be especially interesting.

6. 7. Implications for education and practice

The findings of this thesis can be used to make tentative educational and practice recommendations based on the data collected by a midwife. The findings from these studies demonstrate that pregnancy is viewed by both women and midwives as an

optimal time for women to make healthy changes to lifestyle, motivated by the wish to give their babies the best start in life. However the midwives and women reported various barriers which thwarted this motivation. Midwives lacked confidence in discussing weight management with pregnant women which related to not wishing to offend women and having an absence of training and clinical guidance in this area. This appeared to be reflected in the experiences of the women who noted a lack of discussion with their midwife regarding weight management and dietary and physical activity recommendations. This then is an area in need of addressing and given current concerns about the 'obesity epidemic', providing appropriate training would seem judicious. Training programmes for qualified midwives should not only provide up to date evidence regarding current clinical recommendations but should also include elements that assist in the promotion of behaviour change and skills to address potentially sensitive areas of behaviour that does not stigmatise or offend women.

Health promotion is an area which, according to Midwifery 2020, should be embraced by midwives in order to influence and improve the health and wellbeing of women and their offspring (RCM 2010). As highlighted in study two, at present, often health promotion involves providing literature and basic advice and as recognised in the health psychology literature merely advice is not enough to effect change (Prochaska et al., 1992).

Midwifery education and training in techniques that facilitate behaviour change could assist midwives to address issues such as weight, diet, physical activity and indeed other areas such as alcohol and smoking and may be a more effective approach. For example incorporating Motivational Interviewing into pre-registration midwifery curricular could assist newly qualified midwives to start their career with appropriate training in counselling techniques providing them with confidence to engage with women to facilitate autonomy supportive discussions around behaviour change.

The drive for midwives to have training in Motivational Interviewing in Wales appears to be gaining momentum following the publication of the Welsh Maternity strategy document (Welsh Government, 2011b), with a pilot MI training programme currently under review (NISCHR & CYPRN 2012). However, this form of counselling is a departure from the usual practice and will require midwives to adjust their approach to acknowledge that the woman is the expert in her lifestyle and reasons for behaviour change must be voiced by the pregnant woman and not her health provider. To a profession accustomed to providing directive advice based on evidence, the technique of MI may be at first be challenging but once acclimatised to this style should be fairly straightforward to integrate into practice. Indeed one of the benefits of MI highlighted by

researchers is that its techniques can be readily learned (Lundahl et al., 2010), and once mastered are easily transferable to routine encounters (Jansink et al., 2009).

6. 8. Conclusion

To conclude, improving dietary and physical activity behaviours during pregnancy requires sustained motivation from women which can wane in the face of barriers . Universal midwifery advice which focuses on risk avoidance in pregnancy appears to be at best unhelpful and at worse actually prevents women from adopting healthier behaviours. Instead a more individualised health promotive stance which actively involves women in identifying specific areas of their lifestyle that they believe they can improve would appear to be a more productive approach and which appears to sit comfortably within the woman-centred ethos of midwifery care. Although further research is needed, the 'Eat Well Keep Active' programme may be a suitable intervention to encourage and facilitate women to pursue a healthier lifestyle in pregnancy.

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Appendix 1 Search strategies used for aspects of the literature review

Various search strategies were used to review the evidence for different aspects of the literature review, which start out quite broad and then become more specific and focussed as the chapter progresses.

Sections 1.1.1 - 1.1.6 Background and context

The first sections of chapter one aimed to set the context and as such included relatively broad search terms. Library and web searches were conducted using the NHS Wales e-library for health and Swansea University library catalogue to identify appropriate literature. This literature included a range of research articles, books, policies documents and guidelines. Web sources of information included those sponsored by Government agencies such as the Department of Health, National Institute for Health and Clinical Excellence, Welsh Assembly Government, and Office for National statistics. Journal articles were identified using a range of databases including CINAHL, Pubmed, OVID, ASSIA, Biomed Central, MIDIRS & Wiley. Search terms included: obesity, over-weight, weight, pregnancy, diet, exercise, physical activity, excessive weight gain, BMI.

Other relevant literature was found through tracking references and citations within the retrieved papers to ensure all key literature were included. Recommendations for current clinical practice were obtained using the online resource; UpToDate as well as searching RCOG and NICE guidelines.

Review of lifestyle interventions:

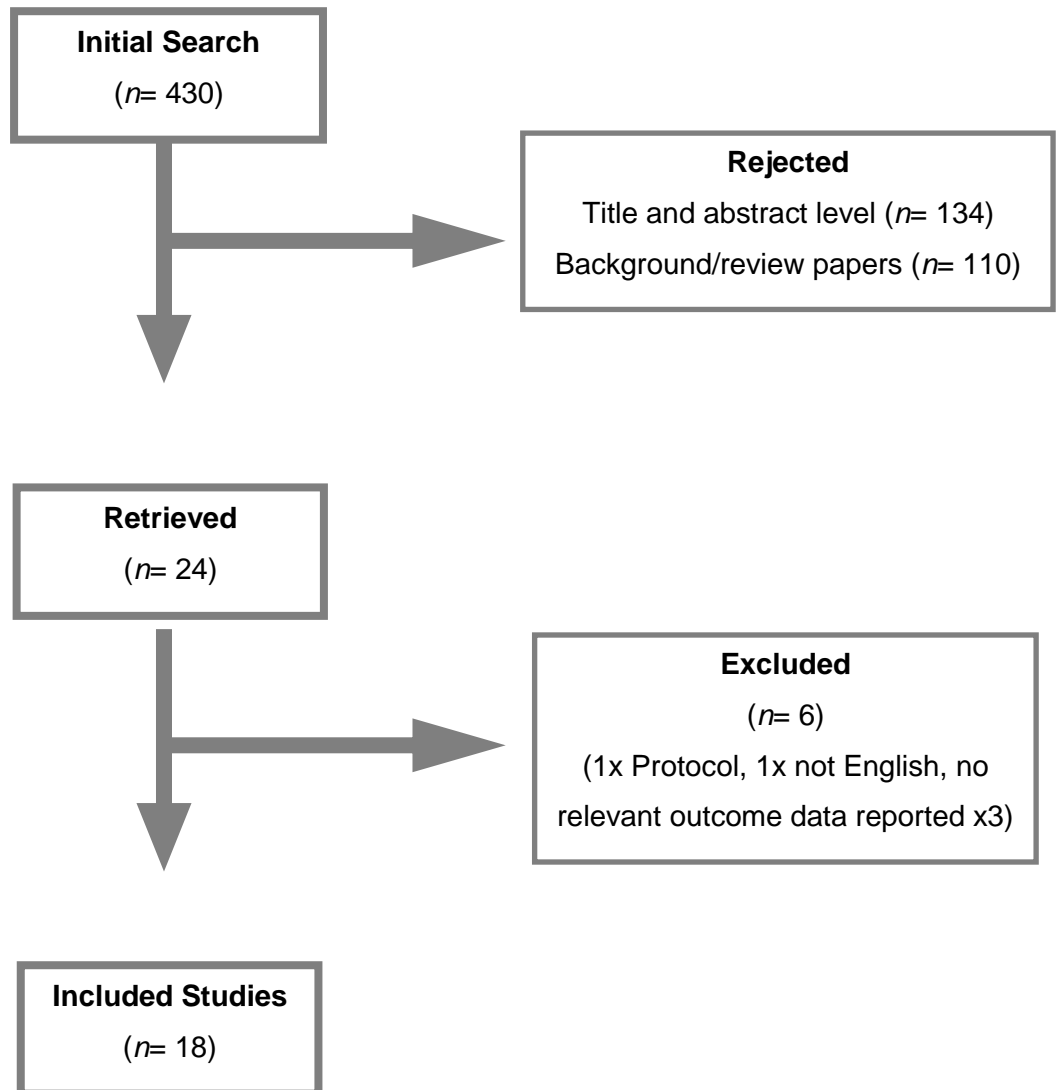
Following on from the earlier section, this aspect of the literature review was more specific and detailed than the earlier section and as such the search strategies were more focussed. Six relevant databases were used to identify the final studies included in the review between January 1990 and January 2012 using search terms: weight gain, intervention and pregnancy within the title and/or abstract. Inclusion criteria were peer reviewed papers, experimental studies, human participants, gestational weight gain included as an outcome measure and English language papers. Exclusion criteria were studies that targeted participants with pre-existing medical complications (other than raised BMI), non-experimental design, studies which did not seek to change either dietary or physical activity behaviour.

Initial search identified 430 papers: (see flow chart over page for further information)

Theories of behaviour change:

Finally this aspect of the chapter was designed to provide an overview of the most frequently used theories of behaviour change. Key health psychology textbooks were used as a starting point and when potential theories for inclusion were identified references were tracked back to discover more about the original theories.

Flow chart for the identification and selection of intervention studies.



Appendix 2 Internal validity of Intervervention studies using Cochrane collaboration tool for assess risk of bias(Higgins &Altman 2011).

- Categories: YES (low risk of bias), NO (high risk of bias) UNCLEAR (uncertain risk of bias) or N/A (not applicable as not an RCT)

| Study | Random sequence generation | Allocation concealment | Blinding of outcome assessment | Incomplete outcome data addressed | Selective reporting | Other sources at risk of bias |
|------------------------|----------------------------|------------------------|--------------------------------|-----------------------------------|---------------------|--|
| Asbee et al 2009 | YES | YES | NO | UNCLEAR | UNCLEAR | Formal deadline limited data collection – unable to achieve pre-determined power |
| Claesson et al 2007 | N/A | N/A | NO | NO | UNCLEAR | Not adequately powered to detect differences in obstetric outcome |
| Gray-Donald et al 2000 | N/A | N/A | NO | YES | UNCLEAR | |
| Guelinckx et al 2010 | UNCLEAR | UNCLEAR | NO | UNCLEAR | UNCLEAR | Not adequately powered to detect reduction in GWG |
| Huang et al 2011 | YES | UNCLEAR | YES | UNCLEAR | UNCLEAR | Does not provide information on how GWG measured |
| Hui et al 2012 | YES | YES | YES | UNCLEAR | UNCLEAR | |
| Jackson et al 2011 | YES | YES | NO | YES | UNCLEAR | Reliance on self-reported measures of pre-pregnancy weight |
| Jeffries et al 2009 | YES | YES | YES | YES | UNCLEAR | Not adequately powered to detect difference in obstetric outcome |
| Kinnuen et al 2007 | N/A | N/A | NO | NO | UNCLEAR | Not adequately powered to detect reduction in GWG |
| Mottola et al 2010 | N/A | N/A | NO | NO | UNCLEAR | Reliance on self-reported measures of pre-pregnancy weight & height |
| Olsen et al 2004 | N/A | N/A | NO | UNCLEAR | UNCLEAR | |
| Phelan et al 2011 | YES | YES | YES | YES | UNCLEAR | Reliance on self-reported measures of pre-pregnancy weight |
| Polley et al 2002 | UNCLEAR | UNCLEAR | NO | YES | UNCLEAR | Reliance on self-reported measures of pre-pregnancy weight |
| Quinlivan et al 2011 | YES | YES | NO | UNCLEAR | UNCLEAR | Not adequately powered to detect reduction in GWG |
| Rosenbloom et al 2012 | N/A | N/A | NO | UNCLEAR | UNCLEAR | Not adequately powered to detect reduction in GWG Reliance on self-reported measures of pre-pregnancy weight |
| Shirazian et al 2010 | N/A | N/A | NO | UNCLEAR | UNCLEAR | Does not provide information on how GWG measured |
| Vinter et al 2011 | YES | YES | NO | UNCLEAR | UNCLEAR | Not adequately powered to detect reduction in obstetric outcome or GWG |
| Wolff et al 2008 | YES | NO | NO | NO | UNCLEAR | |

Appendix 3 ANC Manager Letter Study 1

Lucie Warren
Post Graduate Office
School of Health Science
Swansea University
SA4 6SG
Tel: 01792 518568
Email:294400@swansea.ac.uk
[INSERT DATE]

NAME
Antenatal Clinic Manager
Address 1
Address 2
Address 3
POSTCODE

Dear *insert name*

RE: Proposed Study: A scoping study of the current Antenatal Management of women with a raised Body Mass Index (BMI).

I am a midwife and postgraduate student undertaking a PhD, the above forms part of my doctoral studies. Permission via your head of midwifery has been gained for me to undertake research within [INSERT LHB] into the Antenatal management of women with a raised BMI. Overweight and obesity are areas of concern in midwifery and at present National guidelines on the antenatal care of this high risk group do not exist.

In total 13 Antenatal Clinic Managers including you have been approached across each of those Trusts in Wales that provide maternity care, and are being invited to participate in a one-to-one recorded interview with the researcher. This study aims to provide a comprehensive overview of the current Antenatal management of women with a raised BMI in Wales and your contribution would be valued.

Attached is an information sheet with further details of the study and what participation will entail. Please read this information sheet carefully. In two weeks time I will be contacting you by phone to find out if you are willing to take part. If you would like any more information about this study please feel free to contact me.

Yours sincerely

Lucie Warren

Participant Information Sheet

Project Title: Antenatal Management of weight gain in Pregnancy

You are being invited to take part in a research project. Before you decide it is important you understand why the research is being carried out and what it involves for you. Please read the following information.

What is the research project about?

This project aims to explore the current Antenatal management of weight gain in pregnancy, specifically looking at those women with a raised Body Mass Index (BMI).

Who is carrying out the research?

My name is Lucie Warren and I am a midwife and a PhD student based at the School of Health Science in Swansea University. This research forms part of my doctoral project. The project is funded by Research Capacity Building Collaboration (RCBC), Wales.

Why am I being invited to take part?

Permission for your involvement in this study has been obtained from *insert name of HOM*. Overweight and obesity are areas of concern in midwifery and at present National guidelines on the antenatal care of this high risk group do not exist. This is a scoping study to find out about the antenatal care in Wales of women with a raised BMI and the advice being given regarding their weight gain in pregnancy. All Antenatal Clinic Managers based in large Maternity Units across each Trust in Wales are being invited to participate. Your contribution to this study would be most helpful.

Do I have to take part?

No, it is up to you to decide whether you wish to take part. You do not have to decide now, if you are interested you can contact me on the number provided or alternatively if in two weeks time I have not heard from you, I will contact you to find out if you are happy to participate. This should

give you plenty of time to think it over. If you do not wish to take part, just let me know; you do not need to give a reason and I will not contact you again. If during the study you would like to withdraw, you can do so at any point and you do not have to give a reason.

What will happen to me if I take part?

If you consent to take part we will arrange a suitable date and time to carry out an interview with you in a convenient location, outside of clinic hours. The interview will be audio recorded and may last between 20 - 40 minutes. During that interview I would like to find out about the antenatal care of women with a raised Body Mass Index (BMI) and the advice being given regarding diet, exercise and weight management.

What will be done to make sure that the information is confidential?

At the interview you will be asked to sign a consent form to say you are happy with the use of the information gathered for the purpose of the research. Any contact details obtained, including your name, will be kept separate from the interview information. The transcripts (typed version) of the interview will have all identifiable information removed, including any details that could potentially identify you, such as the name of your Trust. The recordings of the interview will be destroyed at the end of the research.

Any quotes from the interview that may be used in the writing up of a report will be anonymous; you will not be able to identify who or which Trust the quotes are from.

Will I be informed of the research results once it is finished?

If you would like, a summary of the final report can be sent to you.

If I want to take part, what will happen next?

If you decide you wish to take part you may contact me on the number given, or alternatively you can wait for me to call you (approximately 2 weeks).

If you wish to know more about this study please contact:

| Researcher: | Academic Supervisor |
|--|---|
| Lucie Warren Tel: (01792) 518568 Email: 294400@swansea.ac.uk | Dr Jaynie Rance Tel: (01792) 518531 Email: J.Y.Rance@swansea.ac.uk |

Semi-Structured Scoping Interview Schedule

1) Firstly I would like to find out a little bit about this unit

- a. Approximately how many births does this unit have per year?
- b. Can you tell me whether there are “Trust-wide” (now LHB) antenatal care policies/protocols or does this hospital have its own?

2) In this Unit do women get weighed routinely at any point during their antenatal care? And if so...

- a. When?
- b. How?
- c. By Whom?
- d. Is this repeated at any stage?

3) Does your maternity unit provide information to women regarding appropriate levels of weight gain in pregnancy?

- a. PROMPT: -. Leaflets, posters, the Pregnancy book

4) Does this unit provide information to women regarding exercise in pregnancy and if so what?

- Prompt: - RCOG guidelines?

5) Does your maternity unit provide information or guidance on weight gain specifically for overweight/obese women?

- a. If so
 - i. At what stage?
 - ii. What guidance?

6) If women are identified as overweight or obese, are there specific care pathways?

- a. At particular BMI's – which categories?

- b. PROMPT: - Referral to Consultant Led care, weighed again at any stage, referral to anaesthetist/dietician etc.

- 7) **Have you ever experienced patients requesting help/support with their diet?**

- 8) **Do you feel that there has been a change in the number of overweight and obese pregnant women in that last 5 years?**

- 9) **If resources were not an issue, for those women identified as overweight or obese is there any specific care/support that you would like to see implemented?**
 - a. If yes, what & why?
 - b. Do you feel that there are any barriers to this support?

Appendix 6 Consent Form Study 1



Participant Identification Number for this study:

Consent Form

Project Title: Scoping study: Current antenatal clinic management of women with a raised Body Mass Index in Wales

Name of Researcher: Lucie Warren

*Please initial
Each Box*

1. I confirm that I have read and understand the information sheet dated 9/9/09 (version 1) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason.

3. I understand that the interview will be audio recorded and I consent to any anonymised quotes from the interview that may be used verbatim in the writing up of the research project.

4. I understand that all data relating to me obtained for the purpose of the study will be handled in confidence

5. I agree to take part in the above named study.

Name of Participant

____/____/_____
Date

Signature

Name of Person
taking consent

____/____/_____
Date

Signature

2 copies required: 1 copy for participant, 1 copy for the researcher.

Appendix 7 Gatekeeper Letter Study 1

Lucie Warren
Post Graduate Office
School of Health Science
Swansea University
SA4 6SG
Tel: 01792 518568
Email:294400@swansea.ac.uk

[NAME]
Head of Midwifery
Maternity Department
[ADDRESS line 1]
[ADDRESS line 2]
[ADDRESS line 3]
[POSTCODE]

[date]

Dear [NAME],

RE: A scoping study of the current Antenatal Management of women with a raised Body Mass Index (BMI).

I am writing to seek your permission to undertake the above research project within [NAME OF LHB]. The proposed scoping study comprises a one to one interview with the Antenatal Clinic Manager based at [NAME OF HOSPITAL] regarding the care of women with a raised BMI and the advice being given to this group re weight gain in pregnancy. At present national guidelines on the antenatal management of women with a raised BMI do not exist. It is hoped that the information gathered from the scoping study will provide a comprehensive overview of the current antenatal management of these women and discover any consistencies or inconsistencies in the provision across Wales. Six other LHB's across Wales have also been approached to take part.

The study requires an interview with the Antenatal Clinic Manager which will be digitally recorded. Potential participants will first be approached via a letter and if happy to participate, consent will be obtained prior to commencement. The interview is expected to last between 20 and 40 minutes and will take place outside clinic hours at a time and place to suit the ANC Manager. Participants and the Health Board to whom they belong will be anonymised through the secure coding of data and the allocation of pseudonyms. It will not be possible to identify individuals or their employers.

Once data is collected and analysed, a report will be written and a copy sent to you if requested. This scoping study forms part of my doctoral studies and is part two of a three phase study. Advice has been sort from the Chair of the South West Wales Research Ethics Committee and it is his view that this scoping study is considered to be service evaluation and as such does not require submission to a local ethics committee. However, approval has been granted by the School of Health Science Ethics Committee in Swansea University and your R&D Department has reviewed the study and also given their approval. This research project is monitored by Swansea University to

ensure that the principles and requirements of the Research Governance Framework, as set out by the Welsh Assembly Government, are consistently applied.

Please find enclosed a copy of the interview schedule for your information. Should you require any further information please feel free to contact me on the above address or I can be contacted via email. I look forward to hearing from you.

Yours sincerely

Lucie Warren
RCBC PhD Fellow



Participant Information Sheet Part 1

Project Title: Weight gain in pregnancy

You are being invited to take part in a research project. Before you decide it is important you understand why the research is being carried out and what it involves for you. Please read the following information.

What is the research project about?

This project aims to explore women's views and experience of weight gain in pregnancy.

Who is carrying out the research?

My name is Lucie Warren and I am a midwife and a PhD student based at the School of Health Science in Swansea University. This research forms part of my doctoral project. This project is funded by Research Capacity Building Collaboration (RCBC), Wales. This study has been reviewed by the South West Wales Research Ethics Committee.

Why am I being invited to take part?

You have been invited to take part in this study because you are about twelve weeks pregnant with your first baby. I would like to find out about your views and experience of weight gain in pregnancy. I hope to interview a total of 20 women.

Do I have to take part?

No, it is up to you to decide whether you wish to take part. Refusal to take part will not affect the care you receive. You can also withdraw from the study at any point with no consequences, and you do not have to give a reason.

Do I have to decide now?

You do not have to decide now, if you are interested you can complete the contact form which can be found at the end of this information sheet. In approximately two weeks time, I will telephone you to find out if you want take part. This should give you plenty of time to think it over. If you do not wish to take part, just let me know; you do not need to give a reason and I will not contact you again.

What will happen to me if I take part?

If you consent to take part we will arrange a suitable date and time to carry out an interview with you in your own home or if you would prefer another convenient location. Reasonable travel costs will be reimbursed to any participants being interviewed at outside venues. The interview will be audio recorded and may last between 20 minutes and 1 hour. During that interview we will discuss what you think about weight gain in pregnancy. You will also be weighed. About 6 weeks following the birth of your baby, I will contact you again and arrange a suitable date and time to meet you to find out about the birth of your baby. You will be weighed again at this point

and I can compare this with how much you weighed at our first meeting, this will help me find out how much weight women put on as a result of pregnancy.

All information about you will be confidential.

If I want to take part, what will happen next?

Please read part two of the participant information sheet, then complete the attached form and give back to the Midwife who gave you this. Please keep both information sheets for future reference. I will contact you by telephone in approximately two weeks time and if you are happy to participate we will arrange a date and time that suits you to carry out the interview.

How can I find out more information?

Attached to this sheet is Part 2 of the participant information sheet which will give further information about the study, if there is anything you don't understand you can ask the Antenatal Clinic Midwife who gave you this sheet. You can also speak to me before you decide whether or not you wish to take part. My contact details are available on the following pages.

Thank you for taking the time to read this, if this study is of interest to you, further information can found on Participant Information Sheet Part 2 - which is attached to this.

Participant Information Sheet Part 2

Managing weight gain in pregnancy

Thank you for your interest in this research study. Please take the time to read through the information contained in this sheet. If you have any questions please ask the midwife who gave this to you or you can contact the researcher directly, contact details are at the bottom of this page.

What are the possible disadvantages in taking part?

This research project does not involve any risk to you or your baby. It does, however, require a small amount of your time. If you consent to take part a one to one interview will take place either in your home or if you would prefer another convenient location. After the birth of your baby I will interview you again. Both interviews should take between 20 minutes and 1 hour. During the interviews you will be asked a few questions regarding your views and experience so far of weight gain in pregnancy. It is not imagined that these questions would distress you in anyway. If, however you feel uncomfortable during the process, the interview will be paused and if you choose, you may withdraw from the study.

What are the advantages in taking part?

Your participation in this study will be contributing to valuable research which will help with the understanding of women's views and experiences of weight gain in pregnancy and may, in turn, assist midwives in providing future support in this area.

What will be done to make sure that the information is confidential?

At both interviews you will be asked to sign a consent form to say you are happy with the use of the information gathered for the purpose of the research. All the information gathered from you through the study will be kept strictly confidential. Any contact details obtained, including your name, will be kept separate from the interview information. The transcripts (typed version) of the interview will have all identifiable information removed, including any details that could potentially identify you. The recordings of the interview will be destroyed at the end of the research. The academic supervisors will have access to the transcripts but only I will have access to your contact details. Any quotes from the interview that may be used in the writing up of a report will be anonymous; you will not be able to identify who the quotes are from. Should any problems with health or welfare be identified during your participation in the study, you will be referred to an appropriate health professional such as your named midwife or your GP.

Will I be informed of the research results once it is finished?

If you would like, a summary of the final report can be sent to you.

If you wish to contact someone about this study please contact:

| Researcher: | Academic Supervisor |
|--|---|
| Lucie Warren Tel: (01792) 518568 Email: 294400@swansea.ac.uk | Dr Jaynie Rance Tel: (01792) 518531 Email: J.Y.Rance@swansea.ac.uk |

For general advice about taking part in research you can contact [name of rep] NHS Health Board Research and Development Manager on: [telephone number]

This form shows that you are considering taking part in this research. You do not have to decide now. Please complete and give to the Antenatal Clinic Midwife.

Name: _____

Address: _____

Postcode: _____

Telephone: _____

Mobile No: _____

Date form completed: ___/___/_____

Thank you for completing this form. In two weeks time I will contact you to find out if you would like to take part, this should give you plenty of time to think it over.

If you do not wish to take part, just let me know; your contact details will be destroyed. You do not need to give a reason and I will not contact you again.

Please remember to keep the information sheets for future reference.

Semi-Structured Antenatal Interview Schedule

1) Firstly I would like to find out a little bit about you.

- a. How old are you?
- b. Are you in a relationship?
- c. What do you do for a living?
- d. When is your due date?
- e. How tall are you? – pre-pregnancy weight
- f. Who is your community midwife?

2) Before you were pregnant, Do you feel you led a healthy lifestyle if so why/why not?

- a. Diet
 - i. Can you give me an example of the food you eat in a typical day, e.g. yesterday?
 - ii. Do you have friends/a friend who ate particularly well/badly? What did they used to eat?
- b. Exercise
 - i. How much exercise do you do in a typical week – last week for example?
 - ii. Do you have friends who do/have done less/more in pregnancy? What exercise did they do?

3) Please tell me a little about what a healthy lifestyle in pregnancy means to you.

- a. Diet
 - i. Foods to avoid & why?
 - ii. Foods to increase & why?
 - iii. How much weight & why? –
 1. Should all women put on the same weight? –
 2. if you gain more or less what impact do you feel that will have on woman/ baby
 3. At about 6 weeks after the baby is born do you think a woman of your build will weigh same/more/less than she did before she was pregnant?

4. At a year after the baby is born do you think a woman of your build will weigh same/more/less than she did before she was pregnant?
5. How long before/if she returns back to her pre-pregnant weight?

b. Exercise

- i. Exercise/activities levels in pregnancy?
- ii. Should all pregnant women do the same amount of activity?
- iii. How much & why? – if you do lots what impact do you think it may have on woman/baby

4) Is weight gain in pregnancy something you have thought about?

5) Please tell me whether you have had any advice about a healthy lifestyle in pregnancy.

- a. What advice have you been given?
- b. Where did you get the advice?
 - i. Family or friends? Health professionals? Literature?

6) Have you thought about changing your lifestyle in pregnancy?

- a. How?
- b. What?
- c. Why?

7) If you have thought about altering your lifestyle can you tell me a bit more about this?

- a. Can you see there being any difficulties with this?
- b. What might help you with this?

8) Can you think of anything that a midwife/doctor could do to help those women who would like to alter/improve their lifestyle?



Semi-Structured Postnatal Interview Schedule

- 1) I wanted to find out a bit about the birth of your baby can I ask you some questions about it?**
 - a. Was your baby born on the due date?
 - b. How was your baby born?
 - c. How much did your baby weigh at birth?
 - d. How are you feeding your baby?

- 2) Please tell me about your lifestyle in pregnancy?**
 - a. How did your lifestyle in pregnancy compare to your lifestyle before pregnancy? (i.e. Did it change?)
 - b. Was weight gain something that was of concern to you?
 - c. Diet - Describe what you would eat in a typical day
 - i. Did that change at different times in your pregnancy?
 - ii. Do you feel that you ate healthily in pregnancy?
 - d. Exercise - What (if any) exercise would you do in a typical week
 - i. Did that change at different times in your pregnancy?
 - ii. Do you feel you did too much/little exercise in pregnancy?

- 3) If you had thought about altering your lifestyle in pregnancy please tell me a bit more about this?**
 - a. Did you have any difficulties with this?
 - b. Did you find anything helpful with this?

- 4) How does your current activity levels compare to those in pregnancy and those before you were pregnant?**
- 5) How does your current diet compare to that in pregnancy and that before you were pregnant?**
- 6) Do you have any plans to make any alterations to your lifestyle – diet and exercise?**

Appendix 11 Consent Form Study 2
Patient Identification Number for this study:



Consent Form

Project Title: Managing weight gain in pregnancy: Women's experience

Name of Researcher: Lucie Warren

*Please initial
Each Box*

1. I confirm that I have read and understand the information sheets dated 29/7/09 (version 1.4) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason and without my medical care or legal rights being affected.

3. I understand that the interview will be audio recorded and I consent to any anonymised quotes from the interview that may be used verbatim in the writing up of the research project.

4. I understand that all data relating to me obtained for the purpose of the study will be handled in confidence

5. I understand that my named midwife will be contacted and informed of my participation in the study

6. I agree to take part in the above named study.

_____/_____/_____
Name of Participant Date Signature

_____/_____/_____
Name of Person Date Signature
taking consent

*3 copies required: 1 copy for participant, 1 copy for the researcher and 1 copy filed
in patient notes*

Appendix 12 Confirmation Of LREC Opinion Study 2

CUSTOMER
SERVICE
EXCELLENCE
RHAGORWATH MEWN
L GWYBODAETH
Y GWYBODAETH
The Government Standard



**Canolfan Gwasanaethau Busnes
Business Services Centre**

South West Wales REC

Swansea
36 Orchard Street
SWANSEA
SA1 5AQ

Telephone: 01792 607416
Facsimile: 01792 607533

03 August 2009

Ms Lucie Warren
School of Health Science
Swansea University, Singleton Park
Swansea
SA2 8PP

Dear Ms Warren

Study Title: Managing weight gain in pregnancy: Women's experience
REC reference number: 09/WMW02/46
Protocol number: 1.4

Thank you for your letter of 31 July 2009, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chairman.

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, subject to the conditions specified below.

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.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements.

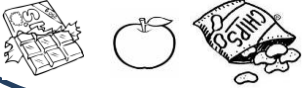
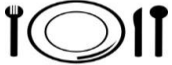



Canolfan Gwasanaethau Busnes GIG Cymru,
Canolfan Henffordd, 36 Stryd y Berllan,
Abertawe. SA1 5AQ
Ffôn: 01792 458066
WHTN: 1780
Ffacs: 01792 607533
TNT QW5/QW3 52

NHS Wales Business Services Centre,
The Oldway Centre, 36 Orchard Street,
Swansea. SA1 5AQ
Telephone: 01792 458066
WHTN: 1780
Fax: 01792 607533
TNT QW5/QW3 52



rhan o Addysgu Bwrdd Iechyd Lleol Powys / part of Powys Teaching Local Health Board

Appendix 13 Goal Setting Chart

| | | |
|---|---|---|
| <p>Snacks</p>  | <p>Meals</p>  | <p>Exercise</p>  |
| | | |
| <p>Transport</p>  | <p>Drinks</p>  | |

Copy for participant

[Participants name]
Pregnancy Goal Card

- ★ *I will swap my unhealthy snacks for fruit or low-fat yoghurt.*
- ★ *I will make time for a healthy breakfast every day.*
- ★ *I will go for a walk every Sunday with my family.*
- ★ *I will take the stairs instead of the lift in work.*
- ★ *I will park a little further away from the supermarket and walk across the car park.*

Copy for researcher

[Participants name]
Pregnancy Goal Card

- ★ *I will swap my unhealthy snacks for fruit or low-fat yoghurt.*
- ★ *I will make time for a healthy breakfast every day.*
- ★ *I will go for a walk every Sunday with my family.*
- ★ *I will take the stairs instead of the lift in work.*
- ★ *I will park a little further away from the supermarket and walk across the car park.*



Appendix 15 Participant Information Sheet Study 3

Participant Information Sheet Part 1

The 'Eat Well Keep Active' Study

You are being invited to take part in the 'Eat Well Keep Active' study. Before you decide whether or not to take part it is important you understand why the study is being done and what it involves for you. The researcher will go through the information sheet with you and answer any questions you have. This should take about 10 minutes. You should take this sheet home with you to keep. You can discuss it with your friends and relatives if you wish.

- **Part 1** Tells you about the study and what will happen if you agree to take part
- **Part 2** Tells you more information about the conduct of the study and what to do if you decide you would like to take part.

Please ask me if there is anything which is unclear or if you would like more information.

What is the research project about?

Pregnant women are advised that a healthy diet and lifestyle in pregnancy can help them to stay well and gives their baby the best start in life. The 'Eat Well Keep Active' programme has been set up by the researcher with the aim of encouraging women to have a healthier lifestyle during their pregnancy. The purpose of this study is to evaluate the 'Eat Well Keep Active' programme and to find out what women think of it, and whether they found it helpful.

Who is carrying out the research?

My name is Lucie Warren and I am a midwife and a PhD student based at the College of Human and Health Science in Swansea University. This research forms part of my doctoral project. This project is funded by Research Capacity Building Collaboration (RCBC), Wales, and this study has been reviewed by the South West Wales Research Ethics Committee.

Why am I being invited to take part?

You have been invited to take part in this study because you are about twelve weeks pregnant, and you do not have any health complications. It is hoped that in total 20 women will take part in the study

Do I have to take part?

No, it is up to you to decide whether you wish to take part.

Do I have to decide now?

You do not have to decide now, if you are interested you can complete the contact form which can be found at the end of this information sheet. In approximately one week's time I will telephone you to find out if you want take part. This should give you plenty of time to think it over. If you do not wish to take part, just let me know; you do not need to give a reason and I will not contact you again. You are free to withdraw at any time, without giving a reason. This would not affect the standard of care you receive.

What will happen to me if I take part?

If you consent to take part you will receive the usual standard of care as well as being part of the 'Eat Well Keep Active' programme. We can arrange a suitable date and time to meet up in your own home or if you would prefer another convenient location. Reasonable travel costs will be reimbursed to any participants who need to travel to venues. You will be asked to sign a consent form and a copy will be stored in your hand held maternity record which will notify your midwife that you are participating in the study.

The 'Eat Well Keep Active' study has three parts; an appointment with the researcher, a follow-up telephone call with the researcher and later on an interview to find out about how you felt about the programme.

1. At the appointment, you will be asked to complete a questionnaire. The purpose of the questionnaire is to find out about your current diet and activity levels and how you feel about them. After this we will have a conversation about ways that you think you might be able to improve your diet or your activity levels during your pregnancy and this will include setting healthy goals. This meeting will be audio recorded and may last between 60-90 minutes. After one week you will be sent a goal card in the post. This card will contain the individual goals that were set during the meeting and is for you to keep.
2. About two weeks after the first meeting I will telephone you to see how you are getting on and whether you have had any problems meeting the goals.
3. Between 6-8 weeks after the first appointment, it is planned that we will have another meeting where you will be asked how you felt about the 'Eat Well Keep Active' programme and whether you found it useful or not. You will again be asked to complete another brief questionnaire. This meeting will be audio recorded and is expected to last between 40-60 minutes.

All information about you will be confidential.

If I want to take part, what will happen next?

Please read part two of the participant information sheet, then complete the attached form and give back to the researcher who gave you this. Please keep both information sheets for future reference. I will contact you by telephone in about one week's time and if you are happy to take part we will arrange an appointment.

How can I find out more information?

Attached to this sheet is Part 2 of the participant information sheet which will give further information about the study, if there is anything you don't understand you can ask me either in the clinic or by telephoning me. My contact details are available on the following pages.

What are the possible disadvantages in taking part?

This research project does not involve any risk to you or your baby. It does, however, require some of your time. If you consent to take part an appointment with me (Lucie) will take place either in your home or if you would prefer another convenient location. The meeting will involve you completing a questionnaire as well as having a conversation about ways you think you might be able to improve your diet and keep active during your pregnancy. This meeting will last between 60-90 minutes. It is planned that I will also follow-up the meeting with a telephone call, which should last 5-10 minutes. After 6-8 weeks I will interview you. During the interview you will be asked a few questions about how you felt about the 'Eat Well Keep Active' programme and will be asked to complete a brief questionnaire. This interview should take between 40-60 minutes. It is not imagined that any part of the study will cause distress. If, however you feel at any point uncomfortable at any point, the session will be paused and if you choose, you may withdraw from the study.

What are the advantages in taking part?

It is not known whether the 'Eat Well Keep Active' programme will encourage women to have a healthy balanced diet and to stay active in pregnancy. Your participation in this study will be contributing to valuable research which may help to find ways to improve women's health during pregnancy.

Will my taking part in the study be kept confidential?

Yes. I will follow ethical and legal practice and all information about you will be handled in confidence. The details are included in Part 2.

Thank you for taking the time to read this, if this study is of interest to you, further information can found on Participant Information Sheet Part 2 - which is attached to this.



Participant Information Sheet Part 2

The 'Eat Well Keep Active' Study

Thank you for your interest in this research study. Please take the time to read through the information contained in this sheet. If you have any questions please ask the researcher in the clinic or her contact details are at the bottom of this page.

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

If you decide you no longer wish to take part in the study just let me know, you will not be asked to give a reason. All information such as questionnaire responses, contact details and audio recordings will be destroyed. You will not be contacted again by the researcher, and it will not affect your maternity care; you will continue to have the usual standard of care.

What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak to the researcher; I will do my best to answer your questions (number below). If you remain unhappy and wish to complain formally, you can do this. Details can be obtained from the [LHB] website at [URL] . Alternatively you can contact the complaints department directly:

Tel: [number] or Email: [email address]

Will my taking part in this study be kept confidential?

All the information gathered from you through the study will be kept strictly confidential. Any contact details obtained, including your name, will be kept separate from the interview information. The transcripts (typed version) of the interview will have all identifiable information removed, including any details that could potentially identify you. The recordings of the meeting and interview will be destroyed at the end of the research. The academic supervisors will have access to the transcripts but only I will have access to your contact details. Any quotes from the interview that may be used in the writing up of a report will be anonymous; you will not be able to identify who the quotes are from. Should any problems with health or welfare be identified during your participation in the study, you will be referred to an appropriate health professional such as your named midwife or your GP.

Will I be informed of the research results once it is finished?

If you would like, a summary of the final report can be sent to you.

Who is organising and funding the research?

This study is funded by the Research Capacity Building Collaboration Wales (RCBC), and is sponsored by Swansea University.

Who has reviewed the study?

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

Further information and contact details:

| | |
|---|--|
| Researcher: | Academic Supervisor |
| Lucie Warren Tel: (01792) 602857 Email: 294400@swansea.ac.uk | Dr Jaynie Rance Tel: (01792) 602068 Email: J.Y.Rance@swansea.ac.uk |

For general advice about taking part in research you can contact [*name of rep*] NHS Health Board Research and Development Manager on: [*telephone number*].

This form shows that you are *considering* taking part in the 'Eat Well, Keep Active' study. You do not have to decide now. Please complete and give to the Antenatal Clinic Midwife or to the researcher.

Name: _____

Address: _____

Postcode: _____

Telephone: _____

Mobile No: _____

Date form completed: ___/___/_____

Thank you for completing this form. In one weeks time I will contact you to find out if you would like to take part, this should give you plenty of time to think it over. If you do not wish to take part, just let me know; your contact details will be destroyed. You do not need to give a reason and I will not contact you again.

Please remember to keep the information sheets attached to this form for your future reference.

'Eat Well Keep Active'

Questionnaire Pack

This pack contains three separate questionnaires:

- ❖ *Pregnancy Food Frequency Questionnaire*
- ❖ *Pregnancy Physical Activity Questionnaire*
- ❖ *Health Care Self Determination Theory Questionnaire.*

Instructions:

Please complete these questionnaires and place in the envelope provided. This envelope should be handed to the researcher when you meet. Please be sure to answer all questions. Thank you.

EAT WELL KEEP ACTIVE

ID Number

Pregnancy Food Frequency Questionnaire (PFFQ)

PFFQ - Adapted from: Rogers, I. and P. Emmett (1998). "Diet during pregnancy in a population of pregnant women in South West England. ALSPAC Study Team. Avon Longitudinal Study of Pregnancy and Childhood." *European Journal of Clinical Nutrition* 52(4): 246-250

Instructions: Please fill in the circles completely, if you need to change your answer, put a cross next to the wrong one.

Example: 1) How many times during the last 4 weeks did you eat:

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|---|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|
| Red meat (beef, lamb, pork, ham, bacon etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |

↑
If you eat ham sandwiches for lunch and have red meat for dinner a couple of times a week, then your answer should look like this

1) How many times during the last 4 weeks did you eat:

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| a) Sausages, burgers | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) Pies, Pasties (pork pie, steak/meat pie etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) Red meat (beef, lamb, pork, ham, bacon etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) Poultry (chicken, turkey etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| f) Other fish (tuna, sardines, salmon, mackerel etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| e) White fish (cod, haddock, plaice, fish fingers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

How many times during the last 4 weeks did you eat:

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| g) Eggs, quiche | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| h) Cheese | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| i) Pizza | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| j) Chips | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| k) Roast potatoes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| l) Boiled, mashed, jacket potatoes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| m) Rice | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| n) Pasta (spaghetti, noodles, lasagne) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| o) Crisps | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| p) Baked beans | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| q) Peas, sweetcorn, broad beans | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| r) Cabbage, brussel sprouts, kale and other green leafy vegetables | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| s) Other green vegetables (green beans, runner beans, leeks etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| t) Fried foods (fried fish, eggs bacon, chops etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

2) How many times during the last 4 weeks did you eat:

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| a) Carrots | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) Other root vegetables (swede, turnip, parsnip etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) Salad (lettuce, tomato, cucumber etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) Fresh Fruit (apple, pear, banana, orange, grapes) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| e) Tinned juice (including tomato juice) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

How many times during the last 4 weeks did you eat:

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| f) Pure juice not in a tin | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| g) Pudding (fruit pie, crumble, cheesecake, mousse, gateaux) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| h) Oat cereals (porridge, Ready Brek, muesli) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| i) Other cereals (Cornflakes, Rice Krispies, Special K, Frosties) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| j) Wholegrain or bran cereals (all bran, Weetabix, Fruit and Fibre) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| k) Cakes or buns (fruit cake, sponge, teacake, buns, doughnut, flapjack, fresh cream cake) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| l) Crispbreads (Ryvita, crackerbread etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| m) Biscuits (digestive, shortcake, HobNobs, Rich Tea, Nice, Marie, Chocolate biscuits,) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

3. How many times during the last 4 weeks did you eat:

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| a) Chocolate bars (Mars, Twix, Wispa, Bounty) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) Chocolate (dairy milk, plain, fruit and nut etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) Pulses (dried peas, bean, lentils, chickpeas) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) Nuts, nut roast | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| e) Bean curd (tofu, miso) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| f) Soya 'meat' (veggie burgers, sausages, vege-mince) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| g) Sweets (peppermints, boiled sweets, toffees, chews, Haribo) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | Always | Sometimes | Not at all | I don't drink soft drinks |
|--|-----------------------|-----------------------|-----------------------|---------------------------|
| 4) When you have a soft drink, how often do you choose low calorie or diet? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| | Less than 1 | 1-2 | 3-4 | 5 or more |
| 5) How many pieces of bread, rolls or chapattis do you eat on a usual day? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | Never or rarely | 1-2 | 3-4 | 5-9 | 10 or more |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 6) How many times a month do you eat take-away foods for your main meal? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

7) What types of bread do you eat most days?

| | Yes | No |
|----------------------------|-----------------------|-----------------------|
| a) White bread | <input type="radio"/> | <input type="radio"/> |
| b) Brown/granary bread | <input type="radio"/> | <input type="radio"/> |
| c) Wholemeal bread | <input type="radio"/> | <input type="radio"/> |
| d) Chapattis, nan bread | <input type="radio"/> | <input type="radio"/> |
| e) Don't usually eat bread | <input type="radio"/> | <input type="radio"/> |

| | Yes all of it | Yes some of it | No | Never eat meat |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 8) Do you eat fat on meat? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

9) What sort of fat do you mainly use?

| | On bread or vegetables | | For frying | |
|--|------------------------|-----------------------|-----------------------|-----------------------|
| | YES | NO | YES | NO |
| a) Butter, Ghee, dripping Lard, Solid cooking fat | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) Hard or soft margarine (e.g. Blue Band, Stork, supermarket own brand) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) Polyunsaturated margarine (flora, sunflower, viatalite) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) Low fat spread (outline, delight, St Ivel Gold) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| e) Sunflower oil, soya oil, corn oil, olive oil | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| f) Other vegetable oil | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| g) Other (please describe) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | Less than 1 | 1-2 | 2-4 | 5 or more |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| 10) How many slices of bread/rolls spread with fat do you normally eat each day? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

11) What type of milk do you use?

| | Yes usually | Yes sometimes | No not at all |
|----------------------------------|-----------------------|-----------------------|-----------------------|
| a) Full fat (blue or silver top) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) Semi skimmed (green top) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) Skimmed (red top) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) Sterilised | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| e) Dried milk | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| f) Goat/sheep milk | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| g) Soya milk | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| h) Other (please describe) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

12) How often do you have milk?

| | Yes usually | Yes sometimes | No not at all |
|--|-----------------------|-----------------------|-----------------------|
| a) In tea | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) In coffee | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) On breakfast cereal | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) As pudding (custard, rice pudding etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| e) To drink on its own | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| f) As a milky drink (hot chocolate, Horlicks, milkshake) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | |
|---|--------------|
| 13) How many cups of tea do you drink in a day (not including herbal tea) | _____ cups |
| 14) How many spoons of sugar in each cup? | _____ spoons |
| 15) How many of the cups of tea you drink each day are decaffeinated? | _____ cups |
| 16) How many cups of coffee do you drink in a day? | _____ cups |
| 17) How many spoons of sugar in each cup? | _____ spoons |
| 18) How many of the cups of coffee you drink each day are decaffeinated? | _____ cups |
| 19) How many of the cups of Coffee you drink each day are made using real coffee (i.e. not instant) | _____ cups |
| 20) How many of these are decaffeinated? | _____ cups |

| | Yes often | Yes sometimes | No not at all |
|--------------------------------------|-----------------------|-----------------------|-----------------------|
| 21) Do you drink herbal teas at all? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | |
|---|------------|
| 22) <u>If Yes:</u> How many cups of herbal tea have you drunk in the past week? | _____ cups |
|---|------------|

| | |
|--|-------------------------|
| 23) Please list the types of herbal teas you have drunk in the past 3 months | _____ _____ _____ |
|--|-------------------------|

24) Do you buy organic foods?

| | Yes usually | Yes sometimes | No never |
|----------------------------|-----------------------|-----------------------|-----------------------|
| a) Fruit | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) Vegetables | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) Meat | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) Other (please describe) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | Yes | No |
|---|-----------------------|-----------------------|
| 25) Apart from herbal teas, are there any other health foods (whether or not bought from a health food shop) that you often eat or drink? | <input type="radio"/> | <input type="radio"/> |

26) If yes, please describe below:

—

—

| | Yes | No |
|--|-----------------------|-----------------------|
| 27) In the past have you ever gone on a diet to lose weight? | <input type="radio"/> | <input type="radio"/> |

If no please go to question 29

| | 1-2 | 3-5 | 6-10 | More than 10 time |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 28) If yes how often? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | Under 1 month | 1-3 months | More than 3 months |
|-----------------------------------|-----------------------|-----------------------|-----------------------|
| 29) How long did your diets last? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | Yes I am now | Yes in the past | No never |
|--|-----------------------|-----------------------|-----------------------|
| 30) Are you, or have you ever been a vegetarian? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | |
|--|-------------|
| 31) <u>If Yes:</u> How many years of your life have you been a vegetarian? | _____ years |
|--|-------------|

| | Yes I am now | Yes in the past | No never |
|---|-----------------------|-----------------------|-----------------------|
| 32) Are you, or have you ever been a vegan (no meat, eggs, milk or cheese)? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | |
|---|-------------|
| 33) <u>If Yes:</u> How many years of your life have you been a vegan? | _____ years |
|---|-------------|

Thank you

Pregnancy Physical Activity Questionnaire (PPAQ)

Adapted from: Chasen-Taber et al (2004) *Biostatistics & Epidemiology*, School of Public Health and Health Sciences, University of Massachsett.

Instructions: Please fill in the circles completely, if you need to change your answer, put a cross next to the wrong one.

Example: During the last 4 weeks, when you are NOT at work, how much time do you usually spend:

If you take care of your mum for 2 hours each day, then your answer should look like this.....



E1. Taking care of an older adult

- None
- Less than ½ hour per day
- ½ to almost 1 hour per day
- 1 to almost 2 hours per day
- 2 to almost 3 hours per day

It is very important you tell us about yourself honestly. There are no right or wrong answers. We just want to know about the things you are doing during the last four weeks.

1. a) **When is your baby due?** _____
- b) **What is your date of birth?** ___/___/___
- c) **Is this your first baby?** _____
- d) **If not how many children do you have?** _____

During the last 4 weeks, when you were NOT at work, how much time did you usually spend:

2. Preparing meals (cook, set table, wash dishes)

- None
- Less than ½ hour per day
- ½ 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 sitting

- None
- Less than ½ hour per day
- ½ 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

During the last 4 weeks, when you were NOT at work, how much time did you usually spend:

4. **Dressing, bathing, feeding children while you are standing**

- None
- Less than ½ hour per day
- ½ 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 sitting or standing**

- None
- Less than ½ hour per day
- ½ 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. **Playing with children while you are walking or running**

- None
- Less than ½ hour per day
- ½ 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. **Carrying children**

- None
- Less than ½ hour per day
- ½ 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. **Taking care of an older adult**

- None
- Less than ½ hour per day
- ½ 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. **Sitting and using a computer or writing, while not at work**

- None
- Less than ½ hour per day
- ½ 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

10. **Watching TV or a DVD**

- None
- Less than ½ hour per day
- ½ 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. **Sitting and reading, talking or on the phone while not at work**

- None
- Less than ½ hour per day
- ½ to almost 2 hour per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

12. **Playing with pets**

- None
- Less than ½ hour per day
- ½ 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. **Light cleaning (make beds, laundry, iron, put things away)**

- None
- Less than ½ hour per day
- ½ 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. **Shopping (for food, clothes, or other items)**

- None
- Less than ½ hour per day
- ½ 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

During the last 4 weeks, when you were NOT at work, how much time did you usually spend:

15. Heavier cleaning (vacuum, mop, sweep, wash)

- None
- Less than ½ hour per week
- ½ 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 while on a riding mower

- None
- Less than ½ hour per week
- ½ 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

17. Mowing lawn using a walking mower. raking

- None
- Less than ½ hour per week
- ½ 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 last 4 weeks, how much time did you usually spend:

18 Walking slowly to go places (such as to the bus, work, visiting) Not for fun or exercise

- None
- Less than ½ hour per day
- ½ 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. Walking quickly to go places (such as to the bus, work, or school) Not for fun or exercise

- None
- Less than ½ hour per day
- ½ 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

20. Driving or riding in a car or bus

- None
- Less than ½ hour per day
- ½ 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 last 4 weeks, how much time did you usually spend:

21. Walking Slowly for fun or exercise

- None
- Less than ½ hour per week
- ½ 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 more quickly for fun or exercise

- None
- Less than ½ hour per week
- ½ 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 Walking quickly up hills for fun or exercise

- None
- Less than ½ hour per week
- ½ 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

During the last 4 weeks how much time did you usually spend:

24. Jogging

- None
- Less than ½ hour per week
- ½ 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. Antenatal exercise

(aqua-natal, pregnancy)

- None
- Less than ½ hour per week
- ½ 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. Swimming

- None
- Less than ½ hour per week
- ½ 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

27. Dancing

- None
- Less than ½ hour per week
- ½ 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.

28.

- _____
- None
 - Less than ½ hour per week
 - ½ 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

29.

- _____
- None
 - Less than ½ hour per week
 - ½ 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 last 4 weeks, how much time did you usually spend:

30. Sitting at working or in class

- None
- Less than ½ hour per day
- ½ to almost 2 hour 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 slowly walking at work while carrying things (heavier than a litre of milk)

- None
- Less than ½ hour per day
- ½ to almost 2 hour per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

32. Standing or slowly walking at work not carrying anything

- None
- Less than ½ hour per day
- ½ to almost 2 hour 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 while carrying things (heavier than a litre of milk)

- None
- Less than ½ hour per day
- ½ to almost 2 hour per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

34. Walking quickly at work not carrying anything

- None
- Less than ½ hour per day
- ½ to almost 2 hour per day
- 2 to almost 4 hours per day
- 4 to almost 6 hours per day
- 6 or more hours per day

**Thank
You**

Health Care – Self-Determination Theory Questionnaire Pack. (HC-SDT)

Adapted from Williams, G. C., R. M. Ryan, et al. (2008). "Health-Care, Self-Determination Theory Questionnaire." Self-Determination Theory an approach to human motivation and personality Retrieved 5/02/2011, from http://www.psych.rochester.edu/SDT/measures/hc_description.php

Treatment Self-Regulation Questionnaire (Diet)

The following question relates to the reasons why you would either start eating a healthier diet or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you.

Instructions: Please indicate the extent to which each reason is true for you, using the 7-point scale by filling in the circles completely, if you need to change your answer, put a cross next to the wrong one.

Example:

1. The reason I would eat a healthy diet is:

a. Because I feel that I want to take responsibility for my own health.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------------|
| Not at all true | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |

If you felt this sentence was very true, then your answer should look like this

1. The reason I would eat a healthy diet is:

a. Because I feel that I want to take responsibility for my own health.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Not at all true | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

b. Because I would feel guilty or ashamed of myself if I did not eat a healthy diet.

| | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Not at all true | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The reason I would eat a healthy diet is:

c. Because I personally believe it is the best thing for my health.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

d. Because others would be upset with me if I did not.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

e. I really don't think about it.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

f. Because I have carefully thought about it and believe it is very important for many aspects of my life.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

g. Because I would feel bad about myself if I did not eat a healthy diet.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

h. Because it is an important choice I really want to make.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The reason I would eat a healthy diet is:

i. Because I feel pressure from others to do so.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

j. Because it is easier to do what I am told, than think about it.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

k. Because it is consistent with my life goals.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

l. Because I want others to approve of me.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

m. Because it is very important for being as healthy as possible.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

n. Because I want others to see I can do it.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

o. I don't really know why.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Treatment Self-Regulation Questionnaire (Exercise)

The following question relates to the reasons why you would either start to exercise regularly or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you.

2. The reason I would exercise regularly is:

a. **Because I feel that I want to take responsibility for my own health.**

| | | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Not at all true | | | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

b. **Because I would feel guilty or ashamed of myself if I did not exercise regularly.**

| | | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Not at all true | | | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

c. **Because I personally believe it is the best thing for my health.**

| | | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Not at all true | | | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

d. **Because others would be upset with me if I did not.**

| | | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Not at all true | | | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

e. **I really don't think about it.**

| | | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Not at all true | | | | | Somewhat true | | | Very true |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The reason I would exercise regularly is:

f. Because I have carefully thought about it and believe it is very important for many aspects of my life.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

g. Because I would feel bad about myself if I did not exercise regularly.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

h. Because it is an important choice I really want to make.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

i. Because I feel pressure from others to do so.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

j. Because it is easier to do what I am told, than think about it.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

k. Because it is consistent with my life goals.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The reason I would exercise regularly is:

l. Because I want others to approve of me.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

m. Because it is very important for being as healthy as possible.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

n. Because I want others to see I can do it.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

o. I don't really know why.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Perceived Competence Scale (Healthy Diet & Exercising regularly)

Please indicate the extent to which each statement is true for you, assuming that you were intending either to improve your diet now or to maintain a healthy diet.

1. I feel confident in my ability to maintain a healthy diet.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

2. I now feel capable of maintaining a healthy diet.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

3. I am able to maintain a healthy diet permanently.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

4. I am able to meet the challenge of maintaining a healthy diet.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

5. I feel confident in my ability to exercise regularly/ keep active.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

6. I now feel capable of exercising regularly/keeping active.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

7. I am able to exercise regularly/keep active over the long term.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

8. I am able to meet the challenge of exercise regularly/Keeping active.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Health Care Climate Questionnaire (Eat Well Keep Active)

This questionnaire contains items that are related to the 'Eat Well Keep Active' Programme in which your **diet** and **exercise/activity** levels were discussed.

- 1. I feel that the researcher provided me with choices and options about changing my diet (including not changing).**

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- 2. I feel that the researcher understood how I see things with respect to my diet.**

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- 3. The researcher conveyed confidence in my ability to make changes regarding my diet.**

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- 4. The researcher listened to how I would like to do things regarding my diet.**

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- 5. The researcher encouraged me to ask questions about my diet.**

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

6. The researcher tried to understand how I see my diet before suggesting any changes.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

7. I feel that the researcher provided me with choices and options about exercising regularly/keeping active (including not exercising regularly).

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

8. I feel that the researcher understood how I see things with respect to my exercise/activity levels.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

9. The researcher conveyed confidence in my ability to make changes regarding my exercise/activity pattern.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

10. The researcher listened to how I would like to do things regarding my exercise/activity levels

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

11. The researcher encouraged me to ask questions about my exercise/activity levels.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

12. The researcher tried to understand how I see my exercise/activity levels before suggesting any changes.

| Not at all true 1 | 2 | 3 | Somewhat true 4 | 5 | 6 | Very true 7 |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Thank you for completing this questionnaire



Appendix 17 Interview Schedule Study 3

Semi-Structured Programme Evaluation Interview

- 1) Firstly I want to find out a little bit about your lifestyle (diet and activity levels) before you became pregnant, Do you feel you led a healthy lifestyle if so why/why not?**
 - a. Diet –
 - i. Did you eat three meals a day?- can you give me an example of what you might have eaten in a typical day?
 - ii. Did you eat snacks between meals if so, what sort and how often?
 - iii. How often would you eat fruit and vegetables
 - iv. Was there anything that you ate that you would consider unhealthy?
 - b. Activity levels-
 - i. Were you active during the day?– (work/travel/playing with children/housework)
 - ii. Did you ever exercise on a regular basis (if so what and how often)
 - iii. How much time would you spend a day sitting down (at a desk in work, on the computer, watching television/reading)

- 2) Before the programme ‘Eat Well Keep Active’ did you have intentions to alter your diet and activity levels because you were pregnant?**
 - a. Diet – what sort of alterations if any and why?
 - b. Activity levels – what sort of alterations if any and why?

- 3) Did the ‘Eat Well Keep Active’ programme make any difference to your lifestyle (diet and exercise)**
 - a. If so in what way and why?
 - i. Diet
 - ii. Activity

- 4) How did you feel about the first session?**
 - a. Can you tell me more about how you felt about the discussion about your diet and activity levels?
 - b. Can you tell me more about how you felt about the goal setting?

- 5) Did you use/refer back to the goal card?**

- 6) Did you encounter any difficulties in meeting the goals that you set?**
 - a. *Can you see there being any difficulties you might have with this later on in your pregnancy?*

7) How did you feel about the follow-up telephone call?

a. Was it helpful to you or not?

8) Was there any aspect to the 'Eat Well Keep Active' programme that you did not find helpful and if so what was it?

9) Was there any part of the 'Eat Well Keep Active' programme that you did not like and if so what part was it?

10) Do you think you will use the goals you have set yourself?

11) Is there anything you can think of that that could be included in the programme that you might have found helpful?

12) Is there any part of the programme that you feel should be removed?

Thank you for your help with this piece of research. Do you have any questions that you would like to ask me?

Appendix 18 Consent Form Study 3

Patient Identification Number for this study:



Consent Form

Project Title: The 'Eat Well Keep Active' Study

Name of Researcher: Lucie Warren

**Please initial
Each Box**

- 1. I confirm that I have read and understand the information sheets dated 09/2/11 (version 1) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

- 2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason and without my medical care or legal rights being affected.

- 3. I understand that the interviews will be audio recorded and I consent to any anonymised quotes that may be used verbatim in the writing up of the research project.

- 4. I understand that all data relating to me obtained for the purpose of the study will be handled in confidence

- 5. I understand that my named midwife will be contacted and informed of my participation in the study

- 6. I agree to take part in the above named study.

_____/_____/_____
Name of Participant Date Signature

_____/_____/_____
Name of Person Date Signature
taking consent

3 copies required: 1 copy for participant, 1 copy for the researcher and 1 copy filed in patient notes

Appendix 19 Confirmation Of LREC Opinion Study 3



GIG
CYMRU
NHS
WALES

Canolfan Gwasanaethau
Busnes
Business Services
Centre

South West Wales REC

Swansea
36 Orchard Street
SWANSEA
SA1 5AQ

Telephone: 01792 607416
Facsimile: 01792 607533

18 March 2011

Ms Lucie Warren
PhD student
College of Human and Health Sciences
Swansea University, Singleton Park
Swansea
SA2 8PP

Dear Ms Warren

Study Title: Feasibility and acceptability of an intervention programme called 'Eat Well Keep Active' which aims to encourage healthier lifestyle in pregnancy using motivational interviewing and goal setting.

REC reference number: 11/WA/0018

The Research Ethics Committee reviewed the above application at the meeting held on 16 March 2011. Thank you for attending to discuss the study.

Ethical opinion

The Committee noted that there was some possibility regarding potential conflict of interest in your role as researcher and midwife. The Committee noted that you acknowledged this issue. It was agreed that it should be clearly stated in the information sheet that you would be acting in a researcher capacity and that should any questions arise relating to the pregnancy, you would refer them to a named midwife.

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

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).

Canolfan Gwasanaethau Busnes GIG Cymru,
Canolfan Henffordd, 36 Stryd y Berllan,
Abertawe. SA1 5AQ
Ffôn: 01792 458066
WHTN: 1780
Ffacs: 01792 607533
Ffacs yr hafan ddiogel: 01792 607234
TNT QW5/QW3 32



NHS Wales Business Services Centre,
The Oldway Centre, 36 Orchard Street,
Swansea. SA1 5AQ
Telephone: 01792 458066
WHTN: 1780
Fax: 01792 607533
Safe Haven Fax: 01792 607234
TNT QW5/QW3 32

rhan o Bwrdd Iechyd Lleol Addysgu Powys / part of Powys Teaching Local Health Board

Carbohydrates:**Table 19 Amount of bread eaten**

| | < 1 | 1-2 | 3-4 | >4 |
|---|-----|-----|-----|----|
| How many pieces of bread do you eat on a usual day? | 5 | 13 | 2 | 0 |

Table 20 Type of bread eaten most days

| | Yes | No |
|-------------------------|-----|----|
| White Bread | 11 | 9 |
| Brown Bread | 7 | 13 |
| Wholemeal bread | 13 | 7 |
| Chapattis/naan | 1 | 19 |
| Don't usually eat bread | 1 | 19 |

Table 21 Carbohydrates - food frequency 4 weeks prior to inclusion

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|----------------------------|-----------------|-----------------|------------------|------------------|----------------------|
| Roast potatoes | 7 | 10 | 2 | 1 | - |
| Boiled or mashed potatoes | - | 4 | 12 | 4 | - |
| Chips | 3 | 7 | 9 | 1 | - |
| Rice | 4 | 8 | 7 | 1 | - |
| Pasta | 1 | 7 | 9 | 3 | - |
| Oat cereals | 6 | 5 | 6 | 3 | - |
| Other cereals | 9 | 4 | 4 | 3 | - |
| Wholegrain or Bran cereals | 6 | 2 | 3 | 9 | - |
| Crispbreads | 14 | 4 | 1 | 1 | - |

Fruit & Vegetables:**Table 22 Fruit & vegetables - food frequency 4 weeks prior to inclusion**

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|------------------------------|-----------------|-----------------|------------------|------------------|----------------------|
| Peas, sweetcorn, broad beans | 3 | 4 | 10 | 3 | - |
| Green leafy vegetables | 6 | 5 | 7 | 1 | - |
| Other green vegetables | 6 | 4 | 9 | 1 | - |
| Carrots | 2 | 6 | 10 | 2 | - |
| Other root vegetables | 8 | 5 | 7 | - | - |
| Salad | 1 | 4 | 8 | 6 | 1 |
| Fresh fruit | 1 | 2 | 3 | 3 | 11 |
| Tinned/carton juice | 13 | 3 | 2 | 1 | - |
| Pure fresh juice | 4 | 2 | 9 | 4 | 1 |

Dairy Produce:

Table 23 Dairy produce - food frequency 4 weeks prior to inclusion

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|--------|-----------------|-----------------|------------------|------------------|----------------------|
| Cheese | 1 | 2 | 14 | 2 | - |

Table 24 Type of milk used

| | Yes usually | Yes sometimes | No not at all |
|-----------------------------|-------------|---------------|---------------|
| Full fat | - | 4 | 16 |
| Semi skimmed | 13 | 2 | 5 |
| Skimmed | 7 | 4 | 9 |
| Other (e.g. goat, soya etc) | - | 2 | 18 |

Table 25 How often milk used

| | Yes usually | Yes sometimes | No not at all |
|---|-------------|---------------|---------------|
| In tea | 13 | 3 | 4 |
| In coffee | 8 | 2 | 9 |
| On breakfast cereal | 18 | - | 2 |
| As a pudding (custard etc) | 4 | 6 | 9 |
| To drink on its own | 6 | 4 | 9 |
| As a milky drink (hot chocolate, milkshake) | 8 | 9 | 3 |

Protein:

Table 26 Protein - food frequency 4 weeks prior to inclusion

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|--|-----------------|-----------------|------------------|------------------|----------------------|
| Red meat | 3 | 4 | 11 | 1 | - |
| Poultry | 1 | 4 | 11 | 4 | - |
| White fish | 7 | 10 | 2 | 1 | - |
| Other fish | 7 | 7 | 6 | - | - |
| Eggs | 5 | 6 | 9 | - | - |
| Baked beans | 6 | 2 | 10 | 2 | - |
| Pulses | 18 | 2 | - | - | - |
| Nuts, nut roast | 14 | 4 | 2 | - | - |
| Burgers, sausages etc | 8 | 9 | 3 | - | - |
| Soya meat (veggie burgers, sausages etc) | 17 | 2 | 1 | - | - |

Foods high in fat and/or sugar:

Table 27 Foods high in fat and/or sugar

| | Never or rarely | Once in 2 weeks | 1-3 times a week | 4-7 times a week | More than once a day |
|----------------------------------|-----------------|-----------------|------------------|------------------|----------------------|
| Pies & Pasties | 7 | 10 | 3 | - | - |
| Pizza | 6 | 10 | 4 | - | - |
| Crisps | 1 | 2 | 10 | 5 | 2 |
| Cakes & buns | 3 | 10 | 5 | 2 | - |
| Biscuits | 4 | 7 | 4 | 5 | - |
| Confectionery bars (e.g. Mars) | 3 | 2 | 13 | 3 | - |
| Chocolate bars (e.g. Dairy Milk) | 6 | 3 | 10 | 1 | - |
| Sweets | 3 | 6 | 8 | 1 | 2 |

Table 28 Type of fat mainly used

| | On bread or vegetables | For frying |
|---|------------------------|------------|
| Butter, Ghee, Dripping, Lard. | 6 | 3 |
| Hard or soft margarine (Blue Band, Stork) | 4 | 1 |
| Polyunsaturated margarine (Flora etc.) | 10 | 1 |
| Low fat spread (Delight, St Ivel) | 4 | 1 |
| Sunflower oil, soya oil, olive oil | 4 | 14 |
| Other vegetable oil | - | 5 |
| Other | - | 1 |

Behaviours:

Table 29 Monthly take-away/fast food consumption

| | Never or rarely | 1-2 | 3-4 | >4 |
|-----------------------------------|-----------------|-----|-----|----|
| How often main meal is take-away? | 2 | 15 | 3 | - |

Table 30 Dieting history

| | Never | 1-2 | 3-5 | >10 | Missing |
|---------------------------------------|-------|-----|-----|-----|---------|
| How many times dieted to lose weight? | 9 | 7 | 2 | 1 | 1 |

Table 31 Length of diet

| | Not dieted | < 1 month | 1-3 months | > 3 Months |
|--|------------|-----------|------------|------------|
| How long has diet to lose weight lasted? | 9 | 3 | 1 | 7 |

Appendix 21 Study 3 Pregnancy Physical Activity Questionnaire Results- Frequency Tables

Table 32 Number of mins spent in activity whilst not at work per day

| | None | < 30 mins | 30-60 mins | 60-120 mins | 120-180 mins | >180 mins |
|--|------|-----------|------------|-------------|--------------|-----------|
| Preparing meals (=2.5 MET) | - | 5 | 8 | 5 | 2 | - |
| Dressing/bathing/feeding children- sitting (=2 MET) | 11 | 4 | 2 | 3 | - | - |
| Dressing/bathing/feeding children- standing (=3 MET) | 14 | 3 | 3 | - | - | - |
| Playing with children – sitting/standing (=2.7 MET) | 9 | 4 | 1 | 2 | 3 | 1 |
| Playing with children - walking/running (=4 MET) | 10 | 5 | 3 | 2 | - | - |
| Carrying children (=3 MET) | 15 | 3 | - | 1 | 1 | - |
| Taking care of an older adult (=4 MET) | 19 | - | - | - | 1 | - |
| Sitting and using a computer/writing (=1.8 MET) | 4 | 10 | 6 | - | - | - |
| Watching TV or DVD (=1 MET) | - | - | 3 | 7 | 8 | 2 |
| Sitting and reading, talking on phone (=1.1 MET) | - | 7 | 7 | 6 | - | - |
| Playing with pets (=3.2 MET) | 8 | 8 | 3 | 1 | - | - |
| Light cleaning (=2.3 MET) | - | 8 | 6 | 6 | - | - |
| Shopping for food clothes other items (=2.3 MET) | 1 | 11 | 2 | 5 | 1 | - |
| Heavier cleaning (=2.8 MET) | 7 | 6 | 3 | 4 | - | - |
| Mowing lawn - ride-on mower (=2.8 MET) | 20 | - | - | - | - | - |
| Mowing lawn - walking mower (=4.4 MET) | 19 | 1 | - | - | - | - |

Table 33 Number of mins spent going places/travel per week

| | None | < 30 mins | 30-60 mins | 60-120 mins | 120-180 mins | >180 mins |
|---|------|-----------|------------|-------------|--------------|-----------|
| Walking slowly to go places (=2.5 MET) | 3 | 6 | 8 | 1 | 1 | 1 |
| Walking quickly to go places (=4 MET) | 5 | 11 | 3 | - | - | - |
| Driving or riding in a car/bus (=1.5 MET) | 1 | 4 | 10 | 5 | - | - |

Table 34 Number of mins spent in activity for fun or exercise per week

| | None | < 30 mins | 30-60 mins | 60-120 mins | 120-180 mins | >180 mins |
|---|------|-----------|------------|-------------|--------------|-----------|
| Walking slowly for fun or exercise (=3.2 MET) | 2 | 9 | 8 | 1 | - | - |
| Walking more quickly for fun or exercise (=4.6 MET) | 10 | 6 | 2 | 1 | - | - |
| Walking quickly up hills for fun or exercise (=6.5 MET) | 13 | 5 | 1 | - | - | - |
| Jogging (=7 MET) | 19 | 1 | - | - | - | - |
| Antenatal exercise (=3.5 MET) | 19 | 1 | - | - | - | - |
| Swimming (=6 MET) | 17 | 1 | 1 | - | 1 | - |
| Dancing (=4.5 MET) | 17 | 2 | 1 | - | -- | - |
| Doing other things for fun or exercise 1 (*) | 14 | 1 | 5 | - | - | - |
| Doing other things for fun or exercise 1 (*) | 18 | - | 1 | 1 | - | - |

Table 35 Number of mins spent in activity for employment per day

| | None | < 30 mins | 30-60 mins | 60-120 mins | 120-180 mins | >180 mins |
|--|------|-----------|------------|-------------|--------------|-----------|
| Sitting at work/class (=1.6 MET) | 5 | 1 | 2 | 2 | - | 10 |
| Standing/slowly walking carrying things (=3 MET) | 11 | 3 | 1 | 1 | 1 | 3 |
| Standing/slowly walking not carrying things (=2.2 MET) | 3 | 2 | 6 | 4 | 1 | 4 |
| Walking quickly carrying things (=4 MET) | 15 | 2 | - | - | 1 | 3 |
| Walking quickly not carrying things (=3.3 MET) | 9 | 5 | 2 | - | - | 4 |