

**Co-designing strategies to enhance midwives' gestational  
weight gain mindlines in relation to South Asian women**

A thesis submitted in partial fulfilment of the  
requirements for the degree of  
Doctor of  
Philosophy  
at Birmingham City University,  
Faculty of Health, Education and Life Sciences  
by  
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August 2023

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## Glossary

BMI	Body mass index
Communities of Practice	CoPs
COVID-19	Coronavirus disease 2019
EBCD	Experience-based co-design
EBM	Energy balance model
EBP	Evidence-based practice
GWG	Gestational weight gain
HRA	Health Research Authority
IOM	Institute of Medicine
IRAS	Integrated Research Application System
KM	Knowledge Management
KMb	Knowledge mobilisation
LOE	Levels of Evidence
NICE	National Institute for Health and Care Excellence
NIHR	National Institute for Health and Care Research
PA	Physical activity
PALS	Patient Advice and Liaison Service
PCSP	Personalised Care Support Plan
RCM	Royal College of Midwives
SECI	Socialisation, Externalisation, Combination and Internalisation
WBI	Weight Bias Internalisation
WHO	World Health Organisation

## Acknowledgements

I have heard that you should stop to look back and admire the view every now and then when you are climbing a mountain. As I reflect on this journey, I am filled with gratitude for the immense support and encouragement I have received along the way.

I would like to thank my primary supervisor, Professor Fiona Cowdell, for providing me with the opportunity to complete this studentship. The encouragement and support of Fiona and my secondary supervisor, Professor Judith Dyson, has been unwavering. I feel extremely fortunate to have benefited from their thorough guidance and feedback, which has allowed me to develop my skills and thinking considerably. From guiding me in publishing my literature reviews, to steering me in the right direction when planning my workshops, I have always felt in safe hands. I would also like to thank Dr Robert Cook for his valuable guidance during the project. His insightful advice and questions have helped to challenge my thinking and consider different perspectives. I am also grateful to Dr Liz Bailey for her generous time in being an adviser in the middle of this project and supporting discussions with maternity Trusts. Liz has helpfully pointed me in the right direction towards a wealth of research and resources related to weight during pregnancy.

I would also like to thank the wonderful women and midwives for their time and openness in participating in this study. I am also grateful to Ruby Handley-Stone, Asmah Bibi, Dr Louise McKnight and Joanna Swan for taking the time to record fantastic voiceovers for my videos. I have also benefited from the support of Afrah Muflihi in helping me to raise awareness of this study amongst midwives and the South Asian community, and for signposting me to Balbir Kaur. Balbir was extremely helpful and welcoming when I presented my study on the radio and television.

Finally, I would like to thank my parents for their support and empathy during this period. In particular, my Mother has been a personal cheerleader in helping me to find participants. From asking customers at her workplace to helping me to approach members of the community, her proactivity helped me to stay positive when recruiting participants.

## Declaration

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

A handwritten signature in black ink, appearing to read 'S. Raju', with a long horizontal stroke extending to the right.

Sereena Raju

## Abstract

**Background:** Excessive gestational weight gain (GWG) is linked with health risks to mother and baby. This problem is particularly prevalent among South Asian women. Midwives are best placed to support healthy weight management during pregnancy. However, research on optimum approaches is sparse. Knowledge mobilisation through enhancement of midwives' mindlines offers a new approach to improving practice.

**Aim:** To: i) understand how midwives' and pregnant South Asian women's GWG mindlines develop and ii) co-design prototype strategies to enhance midwives' mindlines.

**Methods:** Three qualitative stages based on the Socialisation, Externalisation, Combination, Internalisation (SECI) spiral which underpins mindlines theory.

Stage 1: Qualitative interviews with midwives and pregnant women to explore how mindlines develop during *socialisation* and *externalise* knowledge. Findings were *combined* with research evidence within films for the workshops.

Stage 2: Four virtual workshops with midwives and South Asian pregnant women/new mothers to co-design prototype strategies supporting culturally sensitive consultations about weight. These *combined* the *externalised* practical understanding with research evidence.

Stage 3: The prototypes were developed and tested to ensure that the *combined* knowledge can be *internalised* and used by midwives.

**Results:** Stage 1: Mindlines developed through diverse sources during socialisation, and these surpassed information and guidance. For women, issues included family influences (which were particularly strong for South Asian women), physiological changes, environmental factors, and midwifery support. Midwives were challenged by insufficient time and resources, conflicting perceptions of obesity, and perceived engagement from women.

Stage 2: The co-designed prototype strategies that combined and externalised knowledge were: i) a brief talk on the topic at the Midwifery day and ii) an education package for midwives. These were combined within postcards and a film.

Stage 3: Midwives regarded the strategies as acceptable and effective in supporting others to advise and signpost about weight with South Asian women. However, potential areas of burden in relation to time, midwives' context (e.g. perceived relevance to different settings), and women's needs were identified.

**Conclusions:** This study offers a unique contribution to knowledge by novel application of mindlines theory to improve midwives' consultations with pregnant South Asian women

regarding GWG. Additionally, it provides a foundation for further research into mindline amendment to enhance practice in healthcare.

# Chapter 1 Introduction

## 1.1 Introduction

This chapter begins with an overview of the context of this study in relation to excessive gestational weight gain (GWG). This is followed by a summary of how notions of weight gain during pregnancy have shifted within clinical practice in England, and the value of midwives in supporting healthy gestational weight management. Subsequently, a brief discussion of evidence-based practice (EBP) is provided. This is followed by an introduction to the theoretical foundation of this study, which is underpinned by Knowledge Mobilisation (KMb) and mindlines. Finally, an overview of the structure of the thesis is presented.

Although GWG is not monitored nationally, obesity during pregnancy is positively associated with excessive GWG (Herring et al., 2012b; Simko et al., 2019). Across England, the reported prevalence of women categorised as obese during pregnancy increased from 15.6% in 2007 (Heslehurst et al., 2010) to 26.8% in 2022 (NHS Digital, 2023). Furthermore, women from a South Asian background (including those who are Indian, Pakistani, Bangladeshi or from any other Asian background (Minority Rights Group International, 2021)) have a considerably greater risk of stillbirth when obesity is taken into account (Penn et al., 2014). This points to a need for culturally sensitive approaches to supporting South Asian women to manage their weight during pregnancy. In reflecting upon one's biases, stereotypes and power imbalances, the concept of cultural safety can help to address ethnic health inequities (Curtis et al., 2019). Papps and Ramsden (1996: 493) describe cultural safety as “a focus for the delivery of quality care through changes in thinking about power relationships and patients' rights”.

The health of women during pregnancy has been a subject of growing concern within the media (Marshall et al., 2021) and national policy to consider solutions to inequalities in maternal health (Department of Health & Social Care, 2022). From a psychological perspective, pregnancy has been described as a “teachable moment”, in which women are more willing to engage in health protective behaviours due to a shift in their self-concept and an innate desire to safeguard the health of their child (McBride et al., 2003). Indeed, evidence suggests that women are motivated to engage in positive eating habits or abstain from smoking in order to protect the health of their baby during this crucial life stage (Rockliffe et al., 2021). Consequently, this period of receptivity should be seized upon to support healthy weight management during pregnancy (Phelan, 2010).

## **1.2 Weight gain during pregnancy**

Historically, conceptualisations of GWG have shifted considerably within clinical practice in England (Allen-Walker et al., 2016). For instance, routine weighing once stemmed from concerns regarding sufficiency of weight gain during a period of wartime rationing in 1941 (Scott and Benjamin, 1948), but subsequently altered towards an acknowledgement of the risks of pre-eclampsia linked with excessive weight gain (more than two pounds in any week in the third trimester) (Llewellyn-Jones, 1975). More recent evidence confirms that excessive GWG is linked with poorer health outcomes for the mother and baby. These include an increased risk of pregnancy-related hypertension (Institute of Medicine, 2009; Johnson et al., 2013), labour induction (Maier et al., 2016), caesarean birth (de Oliveira Reis et al., 2019; Johnson et al., 2013), and increased birth weight (Johnson et al., 2013; Nunnery et al., 2018; Santos et al., 2019; Zhang et al., 2019). Furthermore, there is evidence that weight loss in between pregnancies is linked with a reduced risk of complications during childbirth (Denison et al., 2018). Therefore, effective weight management during and between pregnancies is a crucial determinant of maternal and child health.

## **1.3 Midwives**

Midwives have a core role in supporting the health and wellbeing of women during pregnancy, labour, and the postpartum period. The term “midwife” means “with woman”, and dates back to the Anglo-Saxon period (Wright, 1998). A more current definition is that of “a person who has acquired the requisite qualifications to be registered and/or legally licensed to practice midwifery and use the title ‘midwife’” (International Confederation of Midwives, 2005: 1). Being a woman’s first and most frequent source of formal contact, midwives are ideally placed to encourage healthy levels of GWG. Supporting healthy weight management during pregnancy forms one of the maternity high impact areas within the Maternity Transformation Programme and NHS Long Term Plan (Public Health England, 2020c).

Although there are no current guidelines in relation to appropriate levels of weight gain during pregnancy, the need for evidence-based guidelines on weight gain has been stressed (National Institute for Health and Care Excellence (NICE), 2010). Midwives (amongst other health professionals) are advised to explain the risks of being overweight to women with a body mass index (BMI) of 30 or more (NICE, 2010). They are also required to explain the benefits of a healthy diet and moderate physical activity, and to dispel any myths such as “eating for two” during pregnancy. However, weight measurement is only required at the first appointment (NICE, 2010). National guidance recommends that local maternity systems

develop an understanding of their population, and work to improve equity in the experiences and outcomes for women from ethnic minority groups and those living in the most deprived areas (NHS England and NHS Improvement, 2021). This underlines the importance of evidence-based practice (EBP) in enhancing midwives' readiness to support South Asian women with their weight. EBP can be understood as the integration of relevant research with clinical expertise and patient values and preferences (Straus et al., 2018). However, the "know-do" gap in research has been well-documented, with an estimate that on average, it takes 17 years to embed research into practice (Morris et al., 2011). Chapter 4 provides a more detailed overview of EBP and explanation of its importance. EBP underpins the theoretical foundation of this study, which is introduced below and outlined in further detail in chapter 4.

## 1.4 Theoretical foundation

Knowledge mobilisation (KMb) involves moving evidence to where it can be most useful (Ward, 2017), and places as much emphasis on experiential knowledge and technical expertise as scientific knowledge. As such, KMb can help to facilitate EBP in relation to midwives' consultations regarding GWG. Of further importance is the need to consider which forms of knowledge align with particular contexts, and how they can be amplified (Moss, 2013). Thus the process of knowledge exchange is fluid, dynamic, and social rather than linear and one-directional (Canadian Institutes of Health Research, 2016; Ward et al., 2012). One approach through which knowledge can be mobilised is through mindlines. Gabbay and le May (2004: 3) defined mindlines as "collectively reinforced, internalised tacit guidelines". Mindlines are a synthesis of multiple sources of knowledge that incorporate prior experience, the views of others, and personal values in addition to guidelines. Consequently, mindlines are more closely aligned with the concept of EBP (Sackett et al., 1996).

Mindlines were conceived in an ethnographic study exploring how GPs and practice nurses made individual and collective decisions in primary care (Gabbay and le May, 2004). Instead of accessing research evidence directly, they were guided by their "mindlines", which were largely informed by their experiences and professional and internal networks. This suggests an inherently *social, context-sensitive process* through which evidence moves into practice. Notably, practitioners had their own hierarchies of evidence that were more amenable to integration within their mindlines. In another ethnographic study of policy making within health and social care, it emerged that research evidence was frequently adapted based upon factors such as personal influence and perceived relevance (Gabbay et al., 2003). Thus, the link between research evidence and practice is far from linear. Mindlines are a



useful lens for understanding how knowledge regarding GWG is shared. Indeed, the powerful influence of cultural norms and organisational culture allude to the social influences that shape how new information (e.g. research evidence or guidelines) is interpreted, and whether it is integrated into one's mindlines. For example, a midwife may feel reluctant to discuss weight due to feelings of stigma that can stem from pervasive health messages from media regarding individual responsibility, in which healthy weight management is often framed as simply consuming less and moving more (Department of Health, 2009). Thus, enhancing midwives' mindlines could help to address the knowledge-practice gap in relation to GWG. This can ensure that they feel more prepared to have culturally sensitive consultations about weight with South Asian women.

I came to this study as a British Asian woman in her mid-thirties, who enjoyed an active lifestyle and took an interest in nutrition. Despite the potential bias generated by my Indian background, this provided me with an insight into South Asian staple foods such as desi ghee (butter), thereby helping me to build a shared understanding with South Asian women in this study. I also acknowledged that my own presumptions surrounding the ease and pleasure of healthy behaviours would not always be held by others. Although I had no experience of weight-related difficulties or pregnancy to date, healthy weight management was a pertinent topic to me, having witnessed other family members experience long-term health conditions linked with their weight. This fuelled my desire to help to make a difference to the health and wellbeing of others. In addition, my exploration of this topic was shaped by the lens of a quantitative background in Public Health data analysis. This influenced my structured approach to exploring and addressing the topic. However, shifting towards a qualitative paradigm guided me towards acknowledging the messy, multi-faceted nature of reality. My positionality is explored in further detail within the reflexive diary entries, which are inserted at different points of the thesis.

## **1.5 Overview of the thesis**

The thesis presents six further chapters after this introductory chapter. In addition, reflexivity is explored across chapters 4-6. Each chapter is described below.

- Chapter 2 – Background: This chapter presents an overview of the main determinants of excessive GWG before a focused discussion of obesity during pregnancy in Birmingham. This is followed by a summary of national guidance and recent scientific evidence in relation to weight management during pregnancy.
- Chapter 3 – Literature review: During the course of this study, four systematic literature reviews were published or submitted as manuscripts to peer-reviewed

journals. These provided an insight into research evidence surrounding the following:

i) midwives' experiences of supporting healthy gestational weight management during routine consultations, ii) women's experiences of interventions to prevent excessive GWG, iii) barriers and facilitators to healthy GWG amongst pregnant women from ethnic minority groups, and iv) interventions to support healthy GWG amongst pregnant women from ethnic minority groups. This chapter provides a critical evaluation of these findings.

- Chapter 4 – Theoretical foundation and research methodology: A more detailed overview of EBP, KMb, and the mindlines model is presented. In addition, a summary of the research methodology is provided.
- Chapter 5 – Methods: This chapter begins with a summary of how the mindlines model was practically applied to enhance midwives' GWG mindlines. This is followed by a detailed description of the methods that underpinned each research stage: i) qualitative interviews, ii) co-design workshops, and iii) feasibility testing. The chapter finishes with a summary of ethical considerations, and how rigour was ensured.
- Chapter 6 – Results: This chapter provides a detailed exploration of the findings across the three research stages. The analysis of the interviews provides an understanding of how lay and professional GWG mindlines developed. The summary of the co-design workshops reveals how the practical understanding of co-designers was combined with research evidence and guidelines, which contributed to the prototype strategies. In addition, the acceptability of the strategies and their potential to enhance mindlines was assessed in the feasibility testing stage.
- Chapter 7 – Discussion: This chapter summarises the main findings from this study and situates these within wider research regarding: i) diverging narratives about weight, ii) maternity service provision for women from ethnic minority backgrounds, and iii) mindlines as a conceptual framework to support KMb. This is followed by an overview of the strengths and weaknesses of the study and recommendations for research, policy, and practice. Finally, the thesis concludes with a summary of how the research aim was addressed, and the study's contribution to knowledge.

## **Chapter 2 Background**

This chapter begins with an overarching summary of the global and national prevalence of obesity during pregnancy and excessive GWG. This is followed by an overview of the main determinants of excessive GWG before a focused discussion of obesity in pregnancy in Birmingham. Finally, a summary of national guidance and recent scientific evidence in relation to weight management during pregnancy is presented.

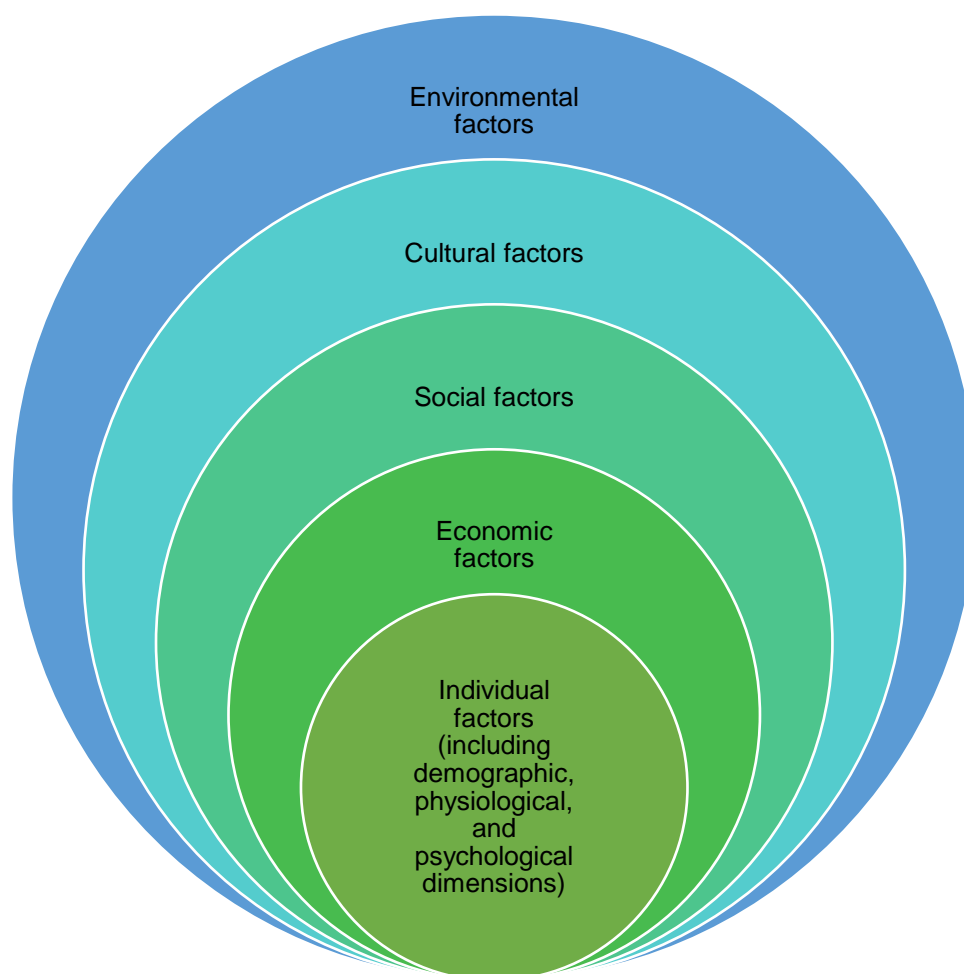
### **2.1 Global and national prevalence of obesity during pregnancy and excessive GWG**

It has been estimated that the global prevalence of excessive GWG, based upon 48 cohort studies of worldwide data, is approximately 45.5% (Zhou et al., 2022). Although GWG is not currently reported within NHS maternity statistics, there is evidence that pre-pregnancy (Houde et al., 2015; Kouba et al., 2023) and early pregnancy obesity (Herring et al., 2012b; Simko et al., 2019) are positively associated with excessive GWG. These measures therefore indicate risk factors of weight gain during pregnancy. According to global estimates, the reported prevalence of obesity during pregnancy increased markedly across high and middle-income countries between 2005-2014 (Chen et al., 2018). In England, this almost doubled between 1989 and 2007 (from 7.6% to 15.6%) (Heslehurst et al., 2010). This later increased to 22.2% of women who were obese at the time of their booking appointment in 2018/19 (NHS Digital, 2019b), and then 26.8% in 2022 (NHS Digital, 2023). It should be noted that the latest data is derived from monthly aggregates of records at 15 weeks gestation, and is only marginally later than the booking appointment, which takes place at 8-12 weeks gestation (NHS, 2019). Nevertheless, this highlights a continued increase in the national prevalence of women categorised as obese during pregnancy.

### **2.2 Main determinants of excessive GWG**

Multiple factors have been associated with excessive GWG. Recent reviews have highlighted that these include those that are individual (including demographic, physiological, and psychological dimensions (Kouba et al., 2023; Sámano et al., 2023; Zhou et al., 2022)), economic, social and cultural (Sámano et al., 2023; Zhou et al., 2022), and environmental (Silva et al., 2023). Figure 2.1 provides a summary of these and is followed by a detailed discussion of the evidence regarding their association with GWG. Crucially, these interact in their influence on GWG. For instance, individual and economic factors may mediate the influence of the environment.

**Figure 2.1: Summary of the main determinants of excessive GWG**



Individual factors related to demographics include both younger (Dolatian et al., 2020; Zhou et al., 2022) and older age (Ebrahimi et al., 2015) and being unemployed (Zhou et al., 2022). Research in relation to women's ethnic background has revealed mixed findings. There is evidence for an increased risk of excessive GWG amongst women from a Black compared with White European (Kouba et al., 2023) and mixed-race Asian compared with Asian backgrounds (Daida and Pedula, 2023). However, it should also be noted that a reduced risk of excessive GWG has also been reported amongst Black (Guo et al., 2019; Mendez et al., 2016) and Asian women (Guo et al., 2019) compared with those who are White European. It is possible that these differences are related to disparities in other individual factors within the samples. For instance, one of these studies reported that Black and Asian women were less likely to smoke during pregnancy (Guo et al., 2019); a factor that has been associated with an elevated risk of excessive GWG (Suzuki et al., 2022).

Evidence in relation to physiological factors is evolving at a rapid rate. For instance, recent research has revealed that specific metabolites are associated with excessive GWG when assessing fasting blood samples, including glutamate (Shearer et al., 2021) and arachidonic acid and isoleucine (Dai et al., 2022). There is also evidence that the prevalence of a leptin receptor gene is three times greater amongst pregnant women who gain excessive GWG compared with those within the recommended categories (Ostafiichuk, 2019). Additionally, specific genetic variations have been linked with a greater risk of excessive GWG amongst women with pre-gestational diabetes (Santos et al., 2022). Some examples of psychological factors linked with excessive GWG include depressive symptoms (Badon et al., 2019; Geyer et al., 2023) and a mood disorder diagnosis (Kouba et al., 2023). Consequently, the evidence above connects multiple individual factors with excessive GWG.

Economic factors are also a crucial area of consideration. For example, lower income levels have been linked with both a reduced (Garay et al., 2021) and increased risk of excessive GWG (Campbell et al., 2016; Jesuino et al., 2020). It is possible that this u-shaped relationship is associated with food insecurity, which has been shown to mediate both inadequate and excessive GWG (Arzhang et al., 2022). Social factors linked with excessive GWG include lower perceived social support (Dolatian et al., 2020; Hartley et al., 2015) and a larger household size (Dolatian et al., 2020). This accentuates the value of social capital (the resources we receive through our connections with others (Kawachi et al., 2008)) as a protective factor in health behaviours and outcomes (Ehsan et al., 2019; Rodgers et al., 2019). Cultural factors refer to the norms, beliefs, and values held by a defined group of people (Kang et al., 2019). Some examples of those that may influence GWG include cultural norms of not participating in vigorous activity in China (Zhang et al., 2014) and those that require women from Pakistani backgrounds to prioritise household duties over individual concerns (Kokab et al., 2020; Ludwig et al., 2011). In chapter 3, the specific cultural factors that support or hinder the experiences of weight management amongst pregnant women from ethnic minority backgrounds are explored in further detail.

Several environmental factors have also been associated with excessive GWG, including reduced neighbourhood proximity to green spaces (Wang et al., 2023) and residing in regions with a high number of mixed food establishments (both healthy and unhealthy) (Silva et al., 2022). In addition, a secondary analysis of maternal lifestyle interventions revealed a significant interaction with the prevalence of fast-food restaurants (Phelan et al., 2021). Here, there were significantly lower levels of GWG amongst individuals living in areas with a low fast-food density, but no effect in those from areas with a higher fast-food density. In

addition, living in neighbourhoods with high levels of violence (Galin et al., 2017) and poverty for White women (Headen et al., 2018) have been identified as risk factors for excessive GWG. This therefore reinforces the role of the wider determinants of health in shaping an individual's health outcomes (Dahlgren and Whitehead, 1991). The evidence above connects a breadth of individual, economic, social, cultural, and environmental factors with GWG. Having considered the determinants of excessive GWG, the section below will provide a focused discussion of obesity during pregnancy in Birmingham in order to situate this study within its wider context.

## **2.3 Obesity during pregnancy in Birmingham**

There is evidence for a significantly higher prevalence of obesity during pregnancy in Birmingham compared with the national average. Figure 2.2 provides a quarterly summary of the percentage of women recorded as obese at 15 weeks gestation as a proportion of those with a recorded BMI in Birmingham compared with England (NHS Digital, 2023). The data for Birmingham was derived by aggregating provider-level statistics from the following maternity trusts: University Hospitals Birmingham, Sandwell and West Birmingham and Birmingham Women's and Children's NHS Foundation Trust. It should be noted that valid data was only provided by all three trusts for June 2022 – August 2022 inclusive. As such, BMI categories were not reported for the remaining months in particular Trusts.

**Figure 2.2: Percentage of women categorised as obese at 15 weeks gestation across 2022 (NHS Digital, 2023)**

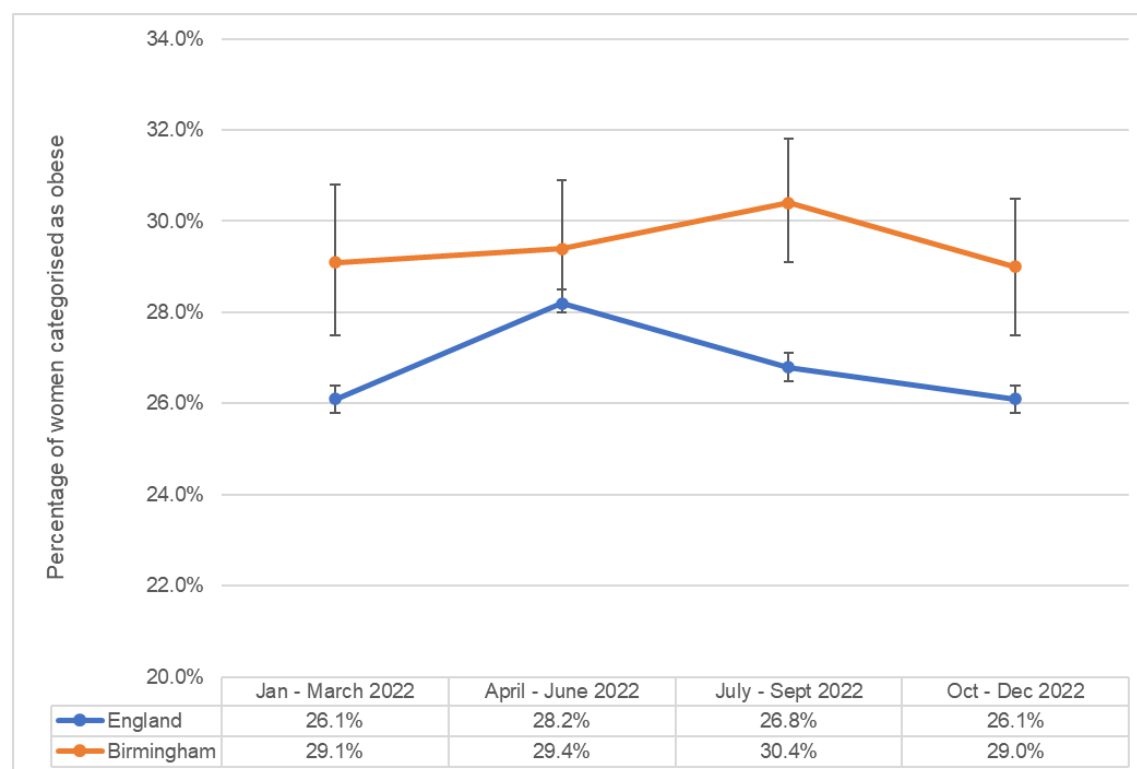


Figure 2.2 indicates a consistently higher proportion of women categorised as obese in Birmingham compared with England. This highlights that the confidence intervals for Birmingham are wider due to the smaller numerators, which indicates greater random variation in the data. However, across three of the quarters, these did not overlap with England. This suggests that the percentage of women categorised as obese was significantly higher than the national average for these periods. It is possible that the prevalence of obesity during pregnancy may be higher than reported due to the lack of a complete dataset. In view of the association between maternal weight and GWG, the actual prevalence of excessive GWG is likely to be higher than recorded.

Birmingham is an ethnically diverse city, with 30% of its population reported to be from a South Asian background (Office for National Statistics, 2021). This group includes those who are Indian, Pakistani, Bangladeshi or from any other Asian background (Minority Rights Group International, 2021). South Asian women have a significantly higher risk of gestational diabetes compared with White European women (Makgoba et al., 2012) and are up to three times more likely to develop some long-term health conditions following a diagnosis of gestational diabetes compared with White women (Diabetes UK, 2022). Since healthy

weight gain during pregnancy has been linked with a reduced risk of gestational diabetes (Harrison et al., 2013), the need for tailored support with this is vital.

It is also important to understand the social and historical context of weight gain in South Asian cultures. During the British Colonial period of 1757-1947, thirty-one severe famines were reported in South Asia (Davis, 2001). This is particularly notable given evidence that exposure to *one* famine is associated with an increased risk of obesity in subsequent generations (Li et al., 2022; Yao et al., 2023). As such, it has been proposed that the higher body fat percentage amongst South Asians (Anand et al., 2011; Shah et al., 2016) evolved as physiological adaptations to multiple famines during the colonial era (Syed et al., 2022). Although South Asians have a history of living in Britain since the seventeenth century (Ayahs, 1986), the major flow of migration took place during the Partition of India in 1947 (Spate, 1967). There is also evidence that immigration is associated with an increased risk of obesity (Goulão et al., 2015; Misra and Ganda, 2007), which may be associated with multiple factors such as the challenges of adopting a different diet (Jenkinson, 2020). This suggests stronger barriers to healthy gestational weight management amongst women from a South Asian background who have recently migrated.

The World Health Organisation (WHO) consultation (2004) identified an elevated risk of morbidity amongst Asian populations at a lower BMI compared with the general population, and created Asian-specific BMI criteria to reflect this. Table 2.1 provides a summary of these in comparison with the classifications for the general population (World Health Organisation, 2000).

**Table 2.1: Comparison of WHO BMI classifications for general and Asian populations**

	<b>General population BMI classifications</b>	<b>Asian BMI classifications</b>
Underweight	<18.5kg/m <sup>2</sup>	<18.5kg/m <sup>2</sup>
Ideal	18.5 – 24.9kg/m <sup>2</sup>	18.5 – 23kg/m <sup>2</sup>
Overweight	25.0 – 29.9kg/m <sup>2</sup>	23 – 27.5kg/m <sup>2</sup>
Obese	≥30kg/m <sup>2</sup>	>27.5kg/m <sup>2</sup>

Despite these thresholds, there is an absence of Asian-specific BMI criteria in antenatal settings (Denison et al., 2018; NICE, 2010). The latest available data indicated that 634 per 1,000 of women from a South Asian background were overweight or obese at the antenatal booking appointment in 2018 (NHS Digital, 2019a). However, the actual prevalence of obesity during pregnancy amongst South Asian women may be higher than standard BMI



criteria suggest (Garcia et al., 2017; Heslehurst et al., 2012). This section has reviewed the prevalence of obesity during pregnancy in Birmingham and has provided a focused discussion of the evidence of its prevalence and adverse impact amongst South Asian women. Subsequently, a summary of Asian-specific BMI criteria was provided, followed by the observation that this is not currently used within antenatal settings. The following section will provide an exploration of national guidance and recent evidence in relation to weight management during pregnancy.

## 2.4 National guidance and recent evidence for weight management during pregnancy

Supporting healthy weight management before, during, and after pregnancy forms one of the maternity high impact areas within the Maternity Transformation Programme and NHS Long Term Plan (Public Health England, 2020c). Within the UK, there are no current guidelines in relation to appropriate levels of weight gain during pregnancy, despite calls from NICE (2010), and media coverage of midwives voicing a requirement for this (Davis and Rawlinson, 2018). Table 2.2 provides an overview of the American Institute of Medicine's (IOM, 2009) recommendations for weight gain amongst women with singleton pregnancies within each BMI category.

**Table 2.2: Recommendations for weight gain for women pregnant with one baby (IOM, 2009)**

Pre-pregnancy BMI category	Recommended total weight gain
Underweight (BMI less than 18.5)	28-40 pounds (12.5-18.0kg)
Normal weight (BMI range of 18.5-24.9)	25-35 pounds (11.5-16.0kg)
Overweight (BMI range of 25.0-29.9)	15-25 pounds (7.0-11.5kg)
Obese (BMI greater than or equal to 30.0)	11-20 pounds (5.0-9.0kg)

Whilst there are no current national guidelines in relation to appropriate levels of weight gain during pregnancy, midwives (alongside other health professionals) are advised to explain the risks of being overweight to women with a BMI of 30 or more (NICE, 2010). Although weight measurement is only required at the first appointment, it is recommended that midwives and other professionals explain the benefits of a healthy diet and moderate physical activity, and to dispel any myths such as “eating for two” during pregnancy (NICE, 2010). Despite the value of this approach, it implicitly aligns with an energy balance model (EBM) of weight, in which weight gain is proposed to be an effect of insufficient energy expenditure and excessive energy consumption (Newburgh and Johnston, 1930; von Noorden, 1905). However, more recent evidence suggests that this hypothesis oversimplifies the multi-

factorial nature of weight management. For instance, weight gain has been linked with diverse factors such as the gut microbiome (Vallianou et al., 2019), sleep quality or quantity (Covassin et al., 2022; Zhao et al., 2021), and the presence of environmental chemicals (Liu et al., 2018; Sun et al., 2022).

Despite the breadth of factors linked with weight gain, the assumption that obesity is primarily caused by a lack of physical activity and a poor diet remains prevalent across scientific literature as well as the media (Chaput et al., 2014). Similarly, this misconception has been attributed to excessive GWG, which overlooks the importance of other factors such as food accessibility, stress, and sleep (Nagpal et al., 2021). Indeed, recent scientific evidence suggests that gestational weight management is influenced by multiple factors such as sleep quality (Lyu et al., 2020; Pauley et al., 2020; Pauley et al., 2023) and emotional health constructs (including depression and perceived stress) (Braig et al., 2020; Kominiarek et al., 2018; Rolińska et al., 2021) in addition to diet and physical activity (Heslehurst et al., 2021; Michel et al., 2019). For instance, the weekly quantity of night time awakening has been positively associated with GWG (Pauley et al., 2020), whilst a similar effect has been found between “good sleep behaviours” (including 7-9 hours of sleep and less night awakenings) and physical activity during pregnancy (Pauley et al., 2023). This is particularly concerning in light of evidence that the majority of women experience sleep disturbances due to pregnancy-related symptoms such as frequent urination and discomfort with some sleep positions (Mindell et al., 2015).

Research in relation to emotional health has revealed mixed findings. For instance, one systematic review showed significant associations between excessive GWG and body image dissatisfaction, depression, and perceptions of low social support, but not stress or anxiety (Hartley et al., 2015). However, other studies indicate significantly higher levels of perceived stress amongst pregnant women who gain both inadequate and excessive GWG (Kominiarek et al., 2018), and a positive relationship between pregnancy-related anxiety (which includes anxiety about giving birth and self-consciousness about giving birth) and GWG (Braig et al., 2020). There are several pathways through which emotional health may influence GWG, including those that are biological (via the production of cortisol) (Lindsay and Nieman, 2005; Sundararajan et al., 2021; Vicennati et al., 2009) and behaviourally related to emotional eating (McDonald et al., 2020; Zhang et al., 2020). Regarding the former, significantly higher levels of cortisol have been observed amongst non-pregnant women who experience rapid weight gain following a stressful event compared with those who do not (Vicennati et al., 2009), whilst pregnant women show significantly greater levels

of cortisol compared with non-pregnant women (Lindsay and Nieman, 2005; Sundararajan et al., 2021). This alludes to a heightened sensitivity to the effects of stress-related weight gain during pregnancy. Importantly, the possibility of a bi-directional relationship has been noted, in which GWG positively predicted stress amongst a German sample of pregnant women in the third trimester (Eichler et al., 2019), and greater levels of anxiety at delivery were observed amongst Chinese women who experienced excessive GWG during pregnancy (Zhou et al., 2023). This may indicate a potential negative impact of GWG on women's body image. Consequently, recent evidence highlights a complex, bi-directional relationship between GWG and individual lifestyle behaviours.

In summary, GWG is highly complex and multi-factorial. It has been demonstrated that nutrition and exercise are just a small component of the multiple and modifiable lifestyle behaviours that have been associated with weight management during pregnancy. Indeed, recent evidence implicates the additional importance of sleep, emotional health, and their connection with nutrition and exercise. This evidence highlights the need for a holistic approach to supporting South Asian women with GWG. However, it is also important to explore the experiences of South Asian pregnant women and midwives in relation to gestational weight management. Indeed, the social and cultural context is an important determinant of lifestyle behaviours (Dahlgren and Whitehead, 1991) and clinical practice (Gabbay and le May, 2004; 2011). The following chapter consists of four systematic literature reviews regarding the experiences of midwives and pregnant women. This includes four publications or manuscripts that were submitted to peer-reviewed journals.

## **Chapter 3 Literature Review**

### **3.1 Introduction**

This chapter provides an overview of the findings from four systematic literature reviews that were conducted and submitted as manuscripts to peer-reviewed journals. Systematic literature reviews involve a comprehensive, rigorous assessment of research (Page et al., 2021), which reduces the risk of bias in the conclusions compared with a traditional literature review (Grant and Booth, 2009). Given the need to inform practice for weight management during pregnancy, the reviews were submitted to peer-reviewed journals and/or published across the duration of the PhD. These involved the following:

1. Midwives' experiences of supporting healthy gestational weight management (Raju et al., 2023a).
2. A systematic review of women's experiences of interventions to prevent excessive GWG (Raju et al., 2023b).
3. Barriers and facilitators to healthy GWG amongst pregnant women from ethnic minority groups.
4. Interventions to support healthy GWG amongst pregnant women from ethnic minority groups.

Across each manuscript, 90% of the content was produced by myself and supplemented by input from my supervisors. A summary of how the reviews fit together and informed the subsequent stages is provided below.

### **3.2 Midwives' experiences of supporting healthy gestational weight management during routine consultations**

This review identified 57 papers. The following three themes were reported: i) emotion and weight, ii) ability to influence, and iii) practical challenges and strategies for success. Although midwives encountered difficulties surrounding the perceived sensitivity of weight and other challenges such as knowledge and skills, personal strategies were adopted and generated success for some.



## Review Article

## Midwives' experiences of supporting healthy gestational weight management: A mixed methods systematic literature review

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## ARTICLE INFO

## Article history:

Received 20 May 2022

Revised 10 May 2023

Accepted 31 May 2023

## Keywords:

Gestational weight gain

Obesity

Maternal

## ABSTRACT

**Background:** Excessive levels of gestational weight gain (GWG) are linked with poorer health outcomes for mother and baby, including an increased risk of pregnancy-related hypertension, labour induction, caesarean delivery and increased birth weight.

**Objective:** To explore literature relating to midwives' experiences and challenges and identify interventions relating to GWG.

**Design:** This review was conducted in accordance with the Joanna Briggs Institute methodology for mixed methods systematic reviews. CINAHL complete, APA PsycArticles, APA PsycInfo, the Cochrane Library and MEDLINE were systematically searched in May 2022. Search terms related to midwives, advice, weight management and experiences were used. A PRISMA approach was taken to identify data, and thematic analysis combined with descriptive statistics allowed synthesis and integration.

**Findings:** Fifty-seven papers were included and three overarching themes were generated; i) emotion and weight, ii) ability to influence and iii) practical challenges and strategies for success. Weight was consistently described as a sensitive topic. Challenges included level of expertise and comfort, perceptions of ability to influence and an awareness of incongruence of midwives' own weight and the advice they are delivering. Interventions evaluated well with some self-reports of improved knowledge and confidence. There was no evidence of impact on practice or GWG.

**Key conclusions:** Although addressing maternal weight gain is an international priority due to the significant risks incurred, in this review we have identified multiple challenges for midwives to support women in healthy weight management. Identified interventions targeting midwives do not directly address the challenges identified and are therefore likely to be insufficient to improve existing practice.

**Implications for practice:** Partnership working and co-creation with women and midwives is essential to ensure knowledge about maternal weight gain is effectively shared across communities to catalyse change.

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## Introduction

Excessive levels of gestational weight gain (GWG) are linked with poorer health outcomes for mother and baby, including an increased risk of pregnancy-related hypertension (Institute of Medicine, 2009; Johnson et al., 2013, labour induction (Maier et al., 2016), caesarean delivery (de Oliveira Reis et al., 2019; Johnson et al., 2013) and increased birth weight (Johnson et al., 2013; Nunnery et al., 2018; Santos et al., 2019; Zhang et al., 2019).

Other critical correlates include poorer body image, depression (Hartley et al., 2015), obesity in the mother up to 15 years later (Linne et al., 2004) and obesity in childhood (Laitinen et al., 2012; Wan et al., 2018).

Guidelines on GWG are available (American College of Obstetricians and Gynaecologists, 2013), however, despite media reports of midwives voicing a need (BBC News, 2018; The Guardian, 2018) there are no current guidelines in the UK. The National Institute for Health and Clinical Excellence (NICE) recommend midwives and other health professionals explain the risks of being overweight to women with a body mass index (BMI) of over 30 and the benefits of a healthy diet and moderate physical activity (PA) (NICE, 2010). Being a woman's first and most frequent source of formal contact, midwives are ideally placed to encourage healthy levels of GWG. Furthermore, supporting healthy weight manage-

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Midwi\* or “matern\* provider” or “matern\* professional”  
 AND  
 interven\* or service\* or interact\* or advi\* or strateg\* or address\* or commun\* or manag\*  
 AND  
 obes\* or weight or diet or nutrition\* or physical activity or exercise  
 AND  
 attitude\* or experience\* or view\* or perspective or evaluat\* or challeng\*

Fig. 1. Search terms used across databases

ment before, during and after pregnancy forms one of the maternity high impact areas within the Maternity Transformation Programme and NHS Long Term Plan (Public Health England, 2020). There is evidence that interventions incorporating midwifery advice in relation to a healthy lifestyle are associated with significantly lower levels of GWG (Bogaerts et al., 2013; Haby et al., 2018; McGivern et al., 2015). It is therefore important to explore midwives' current level of comfort in supporting healthy GWG.

A preliminary search of Google Scholar revealed a scoping review (Dieterich and Demirci, 2020) focusing on communication and counselling practices between healthcare practitioners (including midwives) and pregnant women with obesity. This review did not consider the wider experiences, challenges and interventions experienced or delivered by midwives and it focused only on pregnant women living with obesity. Our review places a specific focus on midwives and incorporates women of all weight categories. The aim of this review is therefore to explore the literature relating to midwives' experiences and challenges and identify interventions relating to GWG, which incorporate lifestyle components in relation to nutrition and physical activity.

## Methods

The protocol of the review was not registered. This review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for mixed methods systematic reviews (Lizarondo et al., 2020).

### Search strategy

We searched CINAHL complete, APA PsycArticles, APA PsycInfo, the Cochrane Library and MEDLINE using PRISMA methodology (Page et al., 2021). The checklist is provided in the first supplementary file. The search strategy included keywords related to the study population, exposure and outcome of interest as reported in figure 1. The search was conducted in March 2022 and updated in May 2022. The full search strategy for all databases is provided in the second supplementary file.

Backward and forward citation searches of included studies were also conducted by screening reference lists and identifying articles that cited the included papers.

### Eligibility

Studies were included if they explored midwives' experiences of advising or supporting women to achieve healthy GWG, which incorporated assistance with nutrition and physical activity. Inclusion and exclusion criteria are summarised in table 1.

### Study selection

Titles and abstracts were screened independently by two reviewers (SR and FC) against the inclusion and exclusion criteria. Studies that met the inclusion criteria were retrieved and full texts reviewed independently by two reviewers (SR and JD). Any disagreements were resolved by the full author team. Numbers identified at each stage are identified in figure 2 with reasons for exclusion. A list of studies excluded at full-text review is provided in the third supplementary file. Studies that included staff other than midwives were only selected if data could be disaggregated.

### Data extraction and quality assessment

Data were extracted from studies using a bespoke spreadsheet which captured: aim, participants, study design, intervention (where relevant), findings and summary score and exceptions to quality. Eligible studies were appraised for methodological quality using the JBI appraisal tools (Moola et al., 2017) according to study design. Studies reporting interventions were assessed using the template for intervention description and replication (TIDieR) (Hoffmann et al., 2014).

### Analysis

Qualitative data were analysed thematically (Clarke et al., 2015) and involved the following stages: familiarisation with the data, initial code generation, searching for themes, reviewing themes, defining and naming themes and producing the report (Braun and Clarke, 2006). Rigour was ensured through the following: i) providing detailed examples from the data (Geertz, 1973) and ii) creating a decision trail (SR) that was shared between the full author team to ensure that interpretations were transparent and consistent. Quantitative data were synthesised descriptively and presented as frequencies and means. Key overarching findings are subsequently summarised.

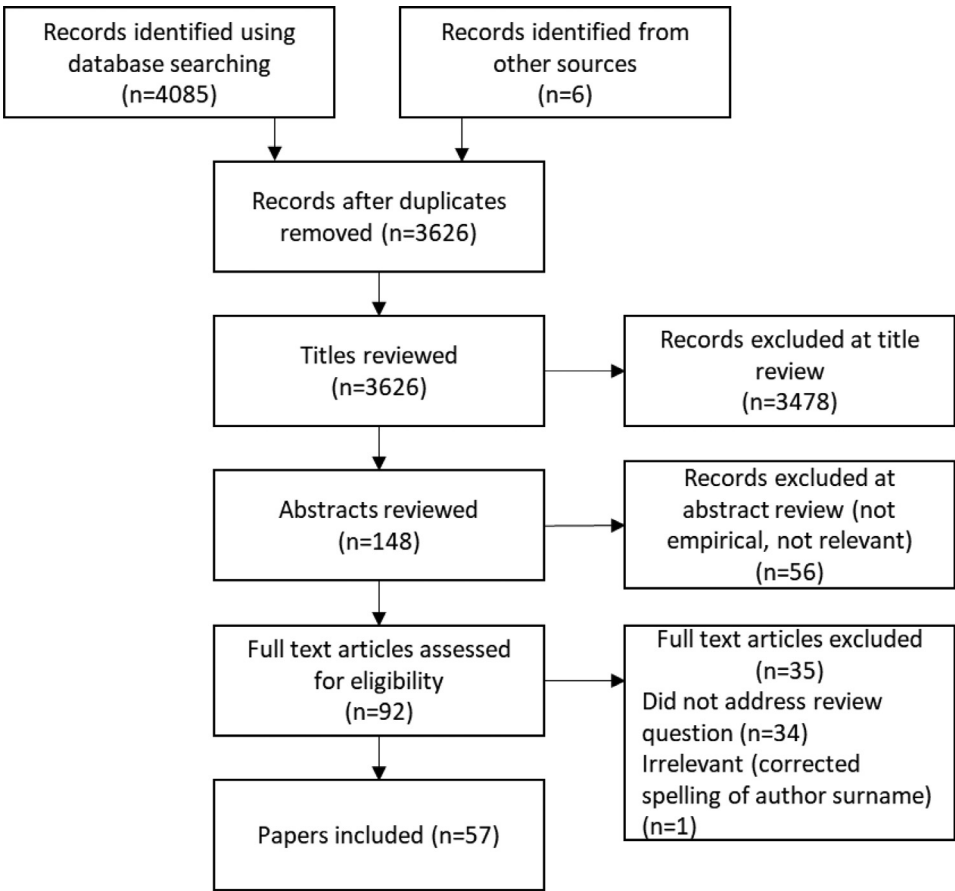
## Results

### Study characteristics

In total, 57 papers were included. A summary of study characteristics is provided in table 2. Quality appraisal scores and denominators were based upon the number of relevant criteria for methodological quality that were met. Exceptions indicate descriptions of criteria that were not met. In addition, an overview of interventions in relation to their description and replicability (TIDieR) (Hoffmann et al., 2014) is provided in table 3. Forty-eight studies explored midwives' experiences and challenges or

**Table 1**  
Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Midwives (including student midwives)	Other health care practitioners
Empirical papers	Non-empirical papers (e.g., editorials and opinion papers)
2014 onwards (inclusive yet current to ensure a contemporary overview that accounts for the increasing complexity of the midwifery workload (Royal College of Midwives, 2016)).	
English language	
International in any setting	



**Fig. 2.** PRISMA 2020 flow diagram of the study selection and screening process

strategies for supporting weight management during pregnancy. Eight explored their experiences of interventions to support practice (Basu et al., 2014; de Jersey et al., 2018; de Jersey et al., 2019; Hart et al., 2018; Heslehurst et al., 2021; Lawrence et al., 2020; Othman et al., 2020; Sanders et al., 2020) and one used both approaches (Hazeldine, 2018). Thirty-nine studies adopted qualitative techniques including interviews (n=25) (Arrish et al., 2017; Asefa et al., 2020; Beulen et al., 2021; Christenson et al., 2018; Doughty, 2019; Flannery et al., 2019; Foster and Hirst, 2014; Goldstein et al., 2020; Hodgkinson et al., 2017; Holton et al., 2017; Lindhardt et al., 2015; Lucas et al., 2020; MacAulay et al., 2019; McCann et al., 2018; McLellan et al., 2019; Morris et al., 2017; Murray-Davis et al., 2020; Okafor and Goon, 2021; Olander et al., 2019; Roberts, 2016; Rundle et al., 2018; Söderström et al., 2022; Strömmer et al., 2021; Wennberg et al., 2014; Wennberg et al., 2015), focus groups (n=9) (Guthrie et al., 2020; Hasted et al., 2016; Knight-Agarwal et al., 2014; Kominiarek et al., 2015; Lawrence et al., 2020; Lindqvist et al., 2014; McKerracher et al., 2020; Moffat et al., 2021; Sanders et al., 2020) and more than one qualitative method (n=5) (Atkinson et al., 2017; Dayyani et al.,

2021; Fieldwick et al., 2014; Furness et al., 2015; Greig et al., 2021). Eleven studies were based on a mixed-methods approach (Arrish et al., 2016; Basu et al., 2014; Christenson et al., 2020; de Jersey et al., 2018; Hart et al., 2018; Hazeldine, 2018; Heslehurst et al., 2015; Hopkinson et al., 2018; MacAulay et al., 2019; Murray-Davis et al., 2022; Othman et al., 2018) and seven used quantitative techniques. Quantitative studies were cross-sectional surveys (n=6) (de Jersey et al., 2019; Haakstad et al., 2020; Pan et al., 2014; Pan et al., 2015; Soltani et al., 2017; Stuart et al., 2016) and a pilot cluster RCT (n=1) (Heslehurst et al., 2021). Most studies were conducted in the United Kingdom (n=23) (Atkinson et al., 2017; Basu et al., 2014; Doughty, 2019; Foster et al., 2014; Furness et al., 2015; Greig et al., 2021; Hart et al., 2018; Hazeldine, 2018; Heslehurst et al., 2015; Heslehurst et al., 2021; Hodgkinson et al., 2017; Hopkinson et al., 2018; Lawrence et al., 2020; Lucas et al., 2020; MacAulay et al., 2019; McCann et al., 2018; McLellan et al., 2019; McParlin et al., 2017; Roberts, 2016; Rundle et al., 2018; Sanders et al., 2020; Soltani et al., 2017; Strömmer et al., 2021), followed by Australia (n=10) (Arrish et al., 2016; Arrish et al., 2017; de Jersey et al., 2018;

**Table 2**  
Summary of included papers

First author (Year) Country	Aim and participants	Methods  Intervention description (where relevant)	Findings	Quality appraisal score and exceptions
Arrish (2016) Australia	To investigate the knowledge, attitudes and confidence relating to GWG. Midwives (n=369)	Web-based survey	Inaccurate knowledge of healthy levels of weight gain, moderate or high confidence in providing advice on weight gain and obesity.	7/7
Arrish (2017) Australia	To explore perceptions of providing nutritional advice. Midwives (n=16)	Semi-structured interviews	Challenges: Time, beliefs and practices of obstetricians, desire to minimise maternal guilt, the need to tailor advice (particularly ethnic minorities), poor resources, belief that women didn't trust their advice, poor access to dietitians. Enabler: Role responsibility.	9/10: Philosophical perspective
Asefa (2020) Ethiopia	To explore views in relation GWG and postpartum weight management. Midwives (n=11)	Interviews	Challenges: lack of knowledge and training, time, workload, competing priorities and lack of confidence.	9/10: Philosophical perspective
Atkinson (2017) UK	To explore experiences of referral to antenatal weight management services. Midwives (n=23)	Interviews and focus group	Challenges: Lack of knowledge of service offered, sensitive subject, women's reluctance.	7/10: Philosophical perspective, researcher positionality and influence
Basu (2014) UK	To explore the efficacy of training on self-reported knowledge and confidence. Midwives (n=32).	Evaluative feasibility pre/post design  Motivational Interviewing (Miller and Rollnick, 2013)/best practice based; dietician led intervention. 3-5 hours of lectures, discussions and activities.	Improvements in knowledge and confidence at post-test. Training was "relevant" and "valuable."	7/8: Control group
Beulen (2021) Netherlands	To explore views of communication practices. Midwives (n=20).	Semi-structured interviews	Challenges: sensitive subject, time, lack of reliable information sources and a need for dietician input.	8/10: Researcher positionality, data analysis not transparent
Christenson (2018) Sweden	To explore communication with women. Midwives (n=17)	Semi-structured interviews	Challenges: sensitive subject, time, need for communication skills training and clearer guidelines and resources for women.	7/10: Philosophical perspective, researcher positionality and influence
Christenson (2020) Sweden	To discuss willingness and attitudes. Midwives n=205	Web-based survey	Challenges: sensitive subject, lack of knowledge, communication skills, time, lack of collaborative working. Enabler: Training, sufficient knowledge.	6/7: Setting was not described in sufficient detail
Dayyani (2021) Denmark	To explore experiences of care and health promotion. Midwives (n=18)	Semi-structured interviews (n=8) and two focus groups (n=10)	Challenges: documentation demands and lack of time.	10/10
de Jersey et al. (2018) Australia	To investigate a brief intervention. Midwives (n=270)	Implementation evaluation involving pre and post questionnaires  "Healthy pregnancy healthy baby" 5As (Glasgow et al., 2003) based, 40-minute training session.	Intervention resulted in increased self-reported knowledge and confidence. Knowledge test score increased pre/post training. Challenges: Lack of time, need for diet and portion size guidance and PA.	7/8: No control group
de Jersey et al. (2019) Australia	To evaluate the use of a pregnancy weight gain chart. Midwives (n=39)	Cross-sectional survey	Most used the tool. Challenges to use: Beliefs that it is the woman's responsibility to complete, lack of time, need for counselling training.	8/8

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Table 2 (continued)

First author (Year) Country	Aim and participants	Methods  Intervention description (where relevant)	Findings	Quality appraisal score and exceptions
Doughty (2019) UK	To explore experiences of caring for pregnant women with obesity Midwives (n=11), student midwives (n=4)	Adapted from an existing chart (Institute of Medicine and National Research Council, 2009). Practitioners plotted weight antenatal appointments. Semi-structured interviews	Challenges: Sensitive topic, some did not consider BMI useful, normalisation of obesity, judgements of women, frustration with women who gain weight. Enablers: empathy for women.	10/10
Fieldwick (2014) New Zealand	To investigate knowledge about GWG. Midwives and lead maternity carers (n=12)	Three semi-structured focus groups (n=11) and one in-depth interview	Challenges: Perceived futility of referral, sensitive subject, normalisation of obesity, poor access to scales, a need for clearer guidelines. Enablers: Awareness of risks, empathy, role identity.	8/10: Philosophical perspective, researcher positionality
Flannery (2019) Ireland	To explore attitudes and beliefs about GWG. Midwives (n=4)	Semi-structured interviews	Challenges: Sensitive subject, beliefs not midwife's role.	7/10: Philosophical perspective, researcher positionality and analysis not transparent
Foster (2014) UK	To explore attitudes. Midwives (n=9)	In-depth individual interviews	Challenges: Sensitive subject, advice compromised by societal stigmatisation and normalisation of obesity and an association between midwife's body image and the perceived credibility of weight-related advice.	8/10: Philosophical perspective, researcher positionality
Furness (2015) UK	To explore the perspectives on GWG management. Midwives (n=8)	Three focus groups (n=7) and one interview	Challenges: Sensitive subject, emotional reactions from women, assumptions that women with obesity lack motivation, feelings of futility in discussing weight, feelings of frustration, social and family norms. Enabler: Role responsibility.	10/10
Goldstein (2020) Australia	To investigate views on a "healthy pregnancy service" (no other details provided). Midwives (n=7)	Semi-structured interviews	Challenges: Sensitive topic, lack of confidence in discussing GWG, women reluctant to engage, lack awareness of the service, waiting times, perceived lack of importance. Enablers: Service embedded, role responsibility, perceived positive impact on women.	9/10: Philosophical perspective
Greig (2021) UK	To explore communication about obesity. Midwives (n=13)	In-depth interviews and reflective practice diaries.	Challenges: Sensitive subject. Enablers: Prioritising the relationship, use of practical experience, learning communication techniques through observation of colleagues.	8/10: Philosophical perspective, researcher positionality
Guthrie (2020) Australia	To investigate different models of care on GWG conversations. Midwives (n=66)	Focus groups	Challenges: Sensitive subject, dietician input and lack of time. Enablers: Empathy. Continuity of care influenced more advice and monitoring of lifestyle.	10/10
Haakstad (2020) Norway	To explore GWG views and practices. Midwives (n=65)	Cross-sectional survey	Challenges: Sensitive subject, nutrition and PA considered more important than GWG, many did not report advice or gave advice not in line with guidelines.	5/5
Hart (2018) UK	To investigate current experiences and impact of online training. Student midwives (n=52)	Pre-post questionnaire and semi-structured interviews (n=8)	Subjective norms, perceived behavioural control and knowledge of BCTs improved. Attitudes and intentions did not change. Interviews identified enhanced knowledge of communication.	Quasi-experimental: 6/8: Confounders not reported, no control group. Interviews: 7/10: Philosophical perspective, researcher positionality, unclear analysis

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Table 2 (continued)

First author (Year) Country	Aim and participants	Methods  Intervention description (where relevant)	Findings	Quality appraisal score and exceptions
Hasted (2016) Australia	To investigate factors influencing weighing. Midwives (n=28)	Adapted from "TEnT PEGS" (Chisholm et al., 2014) and based upon Theory of Planned Behaviour (Ajzen, 1985). Intervention guides health professionals in using behaviour change techniques (BCTs) and tailoring input. Focus groups	Challenges: Lack of privacy when weighing, attitudes towards usefulness of measuring weight, inconsistent protocols, midwife judgement, poor training/guidelines, midwife's own body image, sensitive subject and confidence. Enablers: Weight tracker tool prompted GWG conversations.	8/10: Philosophical perspective researcher positionality
Hazeldine (2018) UK	1. To explore perspectives on obesity, GWG management. 2. Impact of an intervention. Midwives (n=33 and 24 respectively).	1. Focus groups, interviews and 2. questionnaire  Booklet about weight management in pregnancy based upon Theory of Planned Behaviour (Ajzen, 1985) for midwives to give to women.	1. Challenges: sensitive subject, lack of knowledge and resources for women, women being defensive, midwives' frustration with women, lack of guidance re acceptable GWG, lack of role responsibility. 2. Booklet led to increased support offered, no changes in intention or self-efficacy.	1: 10/10. 2: 8/9: No report of confounders
Heslehurst (2015) UK	To explore perspectives on obesity care pathways. Midwives (n=209)	Mixed-methods postal survey	Challenges: Sensitive subject, need for more training, tailoring of guidelines. Enablers: A specific care pathway and good relationships with women made GWG discussions easier, positive relationships.	5/5
Heslehurst (2021) UK	To investigate intervention to support the implementation of GWG guidelines. Midwives (n=68)	Pilot cluster RCT  "GLOWING" (Heslehurst et al., 2018), underpinned by Social Cognitive Theory (Bandura, 1998). Midwife led one day training session to groups of six including information and communication skills. Training pack with reflection activities. One year supply of information resources for women.	In the intervention group, mean self-efficacy scores were higher at post than pre-intervention and control groups for: weight communication, diet, nutrition and PA, risk communication, weight management and signposting/referrals.	8/10: Treatment groups were not similar at baseline and follow-up not reported
Hodgkinson (2017) UK	To explore how midwives and pregnant women view one another in relation to BMI. Midwives (n=11)	Semi-structured interviews	Midwives judged pregnant women as anxious and vulnerable and those with a raised BMI as less health conscious and complacent.	8/10: Philosophical perspective and researcher positionality
Holton (2017) Australia	To explore perspectives about weight management. Midwives (n=2).	Semi-structured interviews	Challenges: women reluctant to discuss weight, stigma and frustration when women did not follow their advice.	6/10: Philosophical perspective, researcher positionality, analysis not transparent
Hopkinson (2018) UK	To examine understanding of physical activity (PA) guidelines and advice given. Midwives (n=59)	Online survey	Challenge: Lack of training. Enabler: Most were confident or very confident about PA knowledge.	5/5

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Table 2 (continued)

First author (Year) Country	Aim and participants	Methods  Intervention description (where relevant)	Findings	Quality appraisal score and exceptions
Knight-Agarwal (2014) Australia	To investigate the views and attitudes towards women with BMI >30, Midwives, (n=28)	Focus groups	Challenges: sensitive subject, normalisation of obesity, denial of risks from women, need for consistent guidelines, discomfort in discussing if midwife experienced being overweight and a sense of powerlessness.	9/10: Researcher positionality.
Kominiarek (2015) USA	To explore perspectives on management of obesity. Midwives (n=25)	Focus groups	Challenges: Frustration with women's lack of understanding of the risks of obesity, need for group-based support, ambivalence about BMI measurement.	7/10: Philosophical perspective, researcher positionality, analysis not transparent.
Lawrence (2020) UK	To explore the acceptability and feasibility of an intervention. Midwives n=4.	Focus group  Healthy Conversation Skills (Barker et al., 2011) based on Social Cognitive Theory (Bandura, 1998). Training guides practitioners in asking open questions around barriers, listening skills and goal setting with women. Two 3–4 hour group sessions delivered by a health trainer, a workbook and follow up call.	Challenges: Lack of time. Enablers: Positive perceptions and perceived utility of the training (in particular addressing sensitive subject/not causing offence) enhanced ability to address barriers.	10/10
Lindhardt (2015) Denmark	To explore experiences of motivational interviewing (MI) when communicating with women with obesity. Midwives (n=6)	Semi-structured interviews	Challenges: Lack of time. Enablers: MI facilitated understanding of how to communicate with women and colleagues.	9/10: No statement of philosophical perspective
Lindqvist (2014) Sweden	To explore experiences in advising women on PA. Midwives (n=41)	Focus group discussions	Challenges: Lack of time and resources, frustration with women's social, psychological and cultural barriers to PA, resignation to women's misunderstanding of PA, challenges in engaging immigrant women. Enablers: Identification of individual facilitators in women. Mixed views on the influence of the midwife's own body.	8/10: Philosophical perspective and analysis not transparent
Lucas (2020) UK	To explore experiences in supporting PA during and after pregnancy. Midwives (n=5)	Semi-structured interviews	Challenges: Lack of training, frustration with women's health behaviours, competing priorities, lack of motivation and responsibility in women, BMI considered unhelpful, sensitive subject. Enablers: Role responsibility.	10/10
MacAulay (2019) UK	To explore barriers and facilitators to GWG interventions. Midwives (n=7)	One-to-one telephone interviews	Challenges: Conflict between knowledge of women and guidelines, lack of time, lack of tailoring to women's needs, need for inter-disciplinary working, sensitive subject, engaging women. Enablers: Confidence in discussing weight following training in motivational interviewing.	8/10: Philosophical perspective and researcher positionality

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Table 2 (continued)

First author (Year) Country	Aim and participants	Methods  Intervention description (where relevant)	Findings	Quality appraisal score and exceptions
McCann (2018) UK	To understand experiences and weight management. Midwives (n=17)	Semi-structured interviews	Challenges: Lack of GWG knowledge, need for guidelines, futility in assessing weight gain, lack of time, lack of clarity on referral pathways, growing numbers of women with obesity, normalisation of obesity. Enablers: awareness of risks of obesity, role responsibility, women's denial of a problem.	9/10: No philosophical perspective stated
McKerracher (2020) Canada	To explore perspectives on diet. Midwives (n=16)	Focus group discussions and stakeholder engagement meeting	Challenge: Sensitive subject. Enabler: empathy with financial barriers for women.	9/10: Philosophical perspective
McLellan (2019) UK	To investigate barriers and facilitators to promoting health behaviours. Midwives (n=11)	Semi-structured interviews	Challenges: Lack of preventative approaches, sensitive subject, lack of time, lack of belief in positive outcome of health behaviours, competing priorities, normalising obesity, fear of being judged on own size. Enabler: Motivation.	10/10
McParlin (2017) UK	To explore the implementation of PA guidelines. Midwives (n=192).	Cross-sectional questionnaire based upon the Theoretical Domains Framework (Michie et al., 2005).	Challenges: Lack of skills (communication), sensitive subject, lack of time, guidelines and referral pathways. Enabler: Role responsibility. Confidence levels varied.	8/8
Moffat (2021) Canada	To examine perceptions of GWG. Midwives (n=16)	Focus group discussions, methods reported elsewhere (McKerracher et al., 2020)	Challenges: Concerns about the impact of women's weight monitoring on their wellbeing. A need for flexibility in nutrition counselling.	Methods reported elsewhere (McKerracher et al., 2020)
Morris (2017) Canada	To explore the link between GWG counselling, knowledge. Midwives (n=5)	Semi-structured interviews	Challenges: Lack of time, perceived need to emphasise wellness instead of weight.	8/10: Philosophical perspective, researcher positionality
Murray-Davis (2020) Canada	To explore GWG counselling practice. Midwives (n=6)	Semi-structured interviews	Challenges: Lack of time, belief that advice would not be effective, women believing myths, awareness of own body size impacted confidence to discuss, need for education.	8/10: Philosophical perspective and analysis not transparent
Murray-Davis (2022) Canada	To investigate experiences of caring for women with obesity. Midwives (n=164)	Web-based surveys (n=144) and semi-structured interviews (n=20)	Challenges: Belief that obesity is not a risk, lack of clarity on best practice, need for communication skills training and guidelines, negative attitudes toward obesity. Enablers: Empathy for women and collaboration.	Survey: 4/4. Interviews: 8/10: Philosophical perspective, researcher positionality
Okafor (2021) South Africa	To explore perspectives on advising women about PA. Midwives. (n=17)	Semi-structured interviews	Challenges: Competing priorities, frustration about women's lack of engagement, lack of knowledge, lack of time, staff shortages, midwives' exhaustion.	8/10: Philosophical perspective, researcher positionality
Olander (2019) Sweden	To investigate GWG prevention strategies. Midwives (n=16)	Semi-structured interviews	Challenges: Communication through interpreters, difficulties changing cultural eating. Enablers: Relationship building, sensitive use of weight terminology, conveying risks without causing worry, use of MI, goal setting and encouragement.	9/10: Philosophical perspective
Othman (2020) Australia	To examine the impact of an intervention. Midwives (n=44)	Quasi-experimental study  "Healthy Eating in Pregnancy" 2-hour researcher led educational workshop or webinar (Othman et al., 2018). Content included guidance on dietary requirements, portion sizes, options for vegans and vegetarians and for women from different cultural backgrounds.	Total knowledge and confidence scores increased immediately after and at 6-8 weeks follow up.	7/8: No control group

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Table 2 (continued)

First author (Year) Country	Aim and participants	Methods  Intervention description (where relevant)	Findings	Quality appraisal score and exceptions
Pan (2014) New Zealand	To explore nutrition, PA and GWG discussions. Midwives (n=428)	Cross-sectional survey	Challenges: varied practice in weight measurement (some using women's report), varied awareness of guidelines, frustration with normalisation of obesity, lack of time. Enablers: Empathy for barriers. Midwives were less likely to recommend PA in women with obesity or who were overweight and recognised a need to tailor advice.	5/5
Pan (2015) New Zealand	To explore the knowledge and practices about obesity during pregnancy. Midwives (n=428)	Cross-sectional survey	Challenges: lack of awareness of some risks, frustration with structural barriers to attending appointments, lack of resources for women who do not speak English, difficulties making referrals (e.g., dietician), negative reactions from women and sensitive subject.	5/5
Roberts (2016) UK	To explore experiences of care for those with BMI>30. Midwives and student midwives (n=18)	Low-structured interviews	Challenges: Shock at women's size, sensitive subject, awareness of own size, frustration with lack of awareness of risks in women, feeling overwhelmed, lack of resources, guidelines and experience and negative judgements toward women. Enablers: Feelings of a need to provide compassionate care,	10/10
Rundle (2018) UK	To explore the perspectives on diet for adolescents. Midwives (n=12)	Semi-structured interviews	Challenges: Lack of ability to motivate, frustration with women's fast-food consumption, lack of information for young women. Enablers: Empathy with social and financial barriers, role responsibility.	8/10: Philosophical perspective researcher positionality
Sanders (2020) UK	To investigate experiences of implementing individualised weight charts and MI-based conversations. Midwives (n=6)	Focus group  Intervention individualised weight chart to use at home or in clinic training in MI-based conversations in relation to GWG. Underpinned by MI (Miller and Rollnick, 2013). Face to face, 3 hours delivered by MI trainer.	Challenges: Denial from overweight women, lack of time, lack of women engagement, need for clearer GWG guidelines, complexity of weight assessment due to fluid retention. Enablers: Perceived effectiveness and simplicity of the intervention.	8/10: Philosophical perspective and researcher positionality

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Table 2 (continued)

First author (Year) Country	Aim and participants	Methods  Intervention description (where relevant)	Findings	Quality appraisal score and exceptions
Söderström (2022) Sweden	To explore perceptions about GWG, diet and PA promotion in Arabic and Somali women. Midwives (n=10)	Semi-structured interviews	Challenges: Providing health information for women with low literacy, empathy toward women's barriers, building trust, poor cultural awareness, lack of time, communicating through an interpreter. Enabler: empathy for women's barriers.	9/10: Philosophical perspective
Soltani (2017) UK	To explore the perspectives of nutritional advice for adolescent women. Midwives (n=46)	Cross-sectional survey	Challenges: Lack of time, lack of guidelines. Enabler: Midwife confidence.	5/5
Strømmer (2021) UK	To explore the perspectives dietary advice for teenagers. Midwives (n=20)	Semi-structured interviews	Barriers: A need for shared responsibility across different professional groups, lack of time, a need to tailor information, lack of information and communication skills training, sensitive subject. Enablers: Beliefs that younger mothers are more receptive to advice, weighing as a pathway for discussions about diet.	9/10: Researcher positionality
Stuart (2016) USA	To explore the techniques used to support GWG. Midwives (n=31)	Cross-sectional survey	Techniques included diet journaling, mindful eating and regular weighing. Challenges to this were women's barriers, lack of time, normalisation of caesarean births among women.	5/5
Wennberg (2014) Sweden	Explored strategies with difficult dietary counselling. Midwives (n=17)	Semi-structured telephone interviews	Strategies used: Active listening and questioning, relationship building, goal setting, repeating messages, including a woman's partner, use of medical risks to "shock." Challenges: Sensitive subject, negative judgments, sense of powerlessness.	8/10: Philosophical perspective, researcher positionality
Wennberg (2015) Sweden	To examine role perception with dietary counselling. Midwives (n=21)	Secondary analysis of interviews (Wennberg et al., 2014) combined with 4 additional semi-structured interviews.	Challenges: Helping women to interpret dietary information, competing priorities, frustration with the lack of concern with healthy eating, addressing cultural habits such as sugar consumption, sensitive subject, lack of knowledge about diet and communication skills.	8/10: Researcher positionality and analysis not transparent

**Table 3**  
Assessment according to TIDieR.

Paper	Rationale stated	Materials described	Procedure described	Expertise/background of person delivering	Mode of delivery reported	Location	When and how much	Tailoring	Modifications	Intervention fidelity (Planned)	Intervention fidelity (Assessed as planned)
Basu (2014)	✓	✓	✓	✓	✓	✓	✓	✓			✓
de Jersey (2018)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
de Jersey (2019)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Hart (2018)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hazeldine (2018)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Heslehurst (2021)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Lawrence (2020)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Othman (2020)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Sanders (2020)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓



**Fig. 3.** Illustration of themes and sub-themes

de Jersey et al., 2019; Goldstein et al., 2020; Guthrie et al., 2020; Hasted et al., 2016; Holton et al., 2017; Knight-Agarwal et al., 2014; Othman et al., 2020) and Sweden (n=7) (Christenson et al., 2018; Christenson et al., 2020; Lindqvist et al., 2014; Olander et al., 2019; Söderström et al., 2022; Wennberg et al., 2014; Wennberg et al., 2015).

#### Methodological quality

The overall methodological quality of qualitative studies was strong. Most exceptions were the absence of underpinning philosophy and researcher positionality/reflexivity. Quantitative studies were generally robust. Papers using quasi-experimental methods did not include control groups.

#### Findings

Data analysis resulted in three themes and nine subthemes (figure 3). Core themes were i) emotion and weight, ii) ability to influence and iii) practical challenges and strategies for success.

##### Theme 1: Emotions and weight

This theme comprises subthemes: empathy versus judgement, weight as a sensitive subject and midwives' frustration. Many midwives were aware of and empathetic to the barriers women experience when trying to follow a healthy lifestyle during pregnancy.

Midwives understood the multiple challenges including i) the emotional health needs of women (Doughty, 2019), ii) other calls on women's time (Arrish et al., 2017; Asefa et al., 2020; Knight-Agarwal et al., 2014; Lindqvist et al., 2014; Söderström et al., 2022), iii) wider cultural norms (Fieldwick et al., 2014; Knight-Agarwal et al., 2014; Lindqvist et al., 2014; Olander et al., 2019; Stuart et al., 2016), iv) socio-economic barriers (Fieldwick et al., 2014; Guthrie et al., 2020; Hazeldine, 2018; McKerracher et al., 2020; Murray-Davis et al., 2022; Pan et al., 2014; Rundle et al., 2018; Stuart et al., 2016; Wennberg et al., 2015) and v) the obesogenic environment (Doughty, 2019). An example relating to emotional health needs; "A lot of ladies might have underlying problems or relationship troubles and something that is getting them down that's making them feel they don't want to exercise, or they don't want to go out." (Doughty, 2019: 245). Wider cultural norms are exemplified by: "It's hard, because the women have just told me that this cultural [food] . . . it's not so healthy . . . it's hard for them to refrain from that; there is a lot about food and so in some cultures. It may be that women find it difficult to change" (Olander et al., 2019: 84). Others were less empathetic and placed responsibility for weight management firmly with the woman (Doughty, 2019; Hodgkinson et al., 2017; Lucas et al., 2020). For example: "People [think they] can't control [their weight], it's happened to them and [they] have no control over it. But actually, people make themselves obese whether consciously or subconsciously"



(Doughty, 2019: 244). Midwives described difficulties in maintaining a non-judgemental approach when encountering feelings of shock regarding a woman's size (Doughty, 2019; Hasted et al., 2016; Roberts, 2016).

The notion of weight gain being a sensitive subject was explicitly reported in nearly half of included papers (n=24) and was implicit in others. It ranked as the second most influential barrier in quantitative data, with 17% of participants reporting that they sometimes avoid discussing weight due to fears of causing distress amongst women (Christenson et al., 2020). Some midwives reported actively managing the discomfort of such conversations, for example: *"We have to accept that we will go through uncomfortable and politically less acceptable conversations with patients to say you are overweight, you are putting your pregnancy at risk. You need to do something about it"* (Knight-Agarwal et al., 2014: 141). Others were more avoidant with one reporting: *"I've found that the issue of being overweight is not addressed at all by midwives. I think it's 'cause it's a sensitive issue. Midwives don't really know how to approach it"* (Roberts, 2016: 179). Midwives feared upsetting or causing offence (Roberts, 2016). They were conscious of societal stigmatisation of obesity (Foster and Hirst, 2014; Holton et al., 2017) and wanted to avoid negativity in relation to a woman's body image (Doughty, 2019; Hasted et al., 2016; Lucas et al., 2020; Murray-Davis et al., 2020; Sanders et al., 2020). Collectively these factors limited the extent to which they engaged in perceived 'difficult' conversations.

Frustration was a frequently cited emotion for a range of reasons such as i) women's lack of awareness of their weight (Atkinson et al., 2017; Furness et al., 2015; Knight-Agarwal et al., 2014; McCann et al., 2018; Roberts, 2016; Sanders et al., 2020), ii) emotional distress (Furness et al., 2015; Hasted et al., 2016; Hazeldine, 2018; Knight-Agarwal et al., 2014; McCann et al., 2018; Pan et al., 2015; Roberts, 2016), iii) a reluctance to question cultural norms (Fieldwick et al., 2014; Pan et al., 2015; Wennberg et al., 2015; Wennberg et al., 2014) and myths surrounding "eating for two" (Fieldwick et al., 2014; Stuart et al., 2016) and iv) a lack of understanding of nutrition (Rundle et al., 2018; Strömmer et al., 2021; Wennberg et al., 2015). This led to a sense of wariness and futility in pursuing weight related discussions as exemplified in the following extracts: *"They don't like it at all to be told they are overweight and we do get complaints coming back that women said 'Oh they said I was fat'"* (Hazeldine, 2018: 98) and: *"These ones [immigrants] are really, really hard. You just have to leave them to eat as usual. They don't eat this and they don't eat that and they eat this and that. Well, what should I do about it then?"* (Wennberg et al., 2014: 111).

#### Theme 2: Ability to influence

Subthemes were roles and responsibilities and midwives' weight and body image. Despite the emotions encountered, midwives generally retained a sense of responsibility to support women with their weight describing themselves as the ideal source (Arrish et al., 2017; McCann et al., 2018; Rundle et al., 2018). Facilitators to effective communication included i) development of nurturing relationships, ii) tailoring information and iii) adopting a holistic approach. Midwives spoke of the importance of establishing rapport with women to facilitate discussions about weight and lifestyle changes (Arrish et al., 2017; Goldstein et al., 2020; Greig et al., 2021; Guthrie et al., 2020; Heslehurst et al., 2015; Lindqvist et al., 2014; Olander et al., 2019; Roberts, 2016; Wennberg et al., 2014). Two studies reported midwives practicing in a 'continuity of care model' (typified by provision of a consistent midwife (or a small team of health professionals) throughout antenatal care and often postnatally) (Arrish et al., 2017; Guthrie et al., 2020). These midwives experienced enhanced opportunities to develop their relationships and alter women's perspectives about weight management compared with those whose

practice was structured in a more traditional model. One midwife exemplifies: *"...as we've built that relationship and gotten trust with the woman that then it would be, like a conversation that you'd have with a friend 'how's the eating going'. And you're much more receptive to changing a women's perceptions at that point."* (Guthrie et al., 2020: e571). In contrast, the value of weight discussion evoked ambivalence in some (Asefa et al., 2020; Doughty, 2019; Foster and Hirst, 2014; Goldstein et al., 2020; McCann et al., 2018).

A minority of midwives suggested weight management was not within the midwifery remit (Flannery et al., 2019; Hazeldine, 2018). Indeed this ranked as a substantial barrier in quantitative assessments identified by a mean proportion of participants of 13.3% across all studies (Arrish et al., 2016; de Jersey et al., 2019). One midwife in an Irish interview study commented: *"I think there [sic] GP should be one that keeps an eye on it [weight], he is the continuous person that's with them"* (Flannery et al., 2019). Similarly, a community midwife in an English study stated in relation to weight advice: *"I suppose because it's not part of our everyday role it's not something that you've been accustomed to having to do...this isn't something that at the moment we have had to incorporate into our daily routine of our practice and therefore I certainly would have to think how I did it"* (Hazeldine, 2018: 96).

Ability to influence was hampered by both societal and individual norms. Several studies report midwives describing a high BMI as unproblematic (Doughty, 2019; Fieldwick et al., 2014; McCann et al., 2018; McLellan et al., 2019; Murray-Davis et al., 2022). For example, *"[a] BMI of 32 wouldn't bother me that much because most women are in this category"* (McCann et al., 2018: 6). Two authors identified such judgements as symptomatic of the increasing number of women with obesity that midwives have supported over time (Doughty, 2019; Roberts, 2016).

Midwives' own weight and body image was also a confounding factor in weight related conversations (Foster and Hirst, 2014; Guthrie et al., 2020; Hasted et al., 2016; Knight-Agarwal et al., 2014; Lindqvist et al., 2014; McLellan et al., 2019; Murray-Davis et al., 2020; Roberts, 2016). One midwife explained: *"if you look at me it's the pot calling the kettle black isn't it."* (Foster and Hirst, 2014: 259). Another reported: *"I've got a woman at the moment whose BMI is 40 something. . . and I'm there, I've got a student who is even more substantial than I am and it's the elephant in the room..."* (Knight-Agarwal et al., 2014: 141). These midwives employ a stark use of similes connoting feelings of discomfort and embarrassment associated with their body size and image. In contrast a small number reported capitalising on their increased body weight to cultivate a shared understanding with pregnant women (Foster and Hirst, 2014; Roberts, 2016).

#### Theme 3: Practical challenges and strategies for success

Subthemes included knowledge, skills and guidelines, time and priorities, personal strategies and interventions. Practical challenges experienced by midwives traversed individual, interpersonal and organisational domains. At an individual level some reported deficits in knowledge and skills. For example, there was a need for more knowledge about healthy lifestyle and weight management during pregnancy (Asefa et al., 2020; Hazeldine, 2018; Heslehurst et al., 2015; McCann et al., 2018; Okafor and Goon, 2021; Strömmer et al., 2021; Wennberg et al., 2015). Sixty-six percent of participants in quantitative studies identified deficits in knowledge and/or training as a significant challenge (Arrish et al., 2016; Christenson et al., 2020; de Jersey et al., 2019; Haakstad et al., 2020; Hopkinson et al., 2018; Murray-Davis et al., 2022; Pan et al., 2014). Additionally, midwives expressed a need for support in providing individualised care for women (Arrish et al., 2017; Christenson et al., 2020; Murray-Davis et al., 2022; Söderström et al., 2022). Other midwives were confident in their knowledge but less so in relation to their com-



munication skills to broach the topic (Christenson et al., 2018; Furness et al., 2015; Roberts, 2016): *"It is a challenge to talk about body weight with overweight women. However, it is not the knowledge I'm lacking, but the communication skills"* (Christenson et al., 2020: 7).

National and local guidelines were helpful in supporting initiation of discussions about weight however, these were not available in all countries or localities. Where available, midwives regarded guidelines as a tool that could be referenced to emphasise their non-judgemental approach and depersonalising weight related discussions (Greig et al., 2021; Heslehurst et al., 2015). Other midwives described locally implemented weight monitoring tools as a stimulus for discussions about women's diet (Hasted et al., 2016; Strömmer et al., 2021). A specific obesity care pathway supported easier discussions and positive relationships (Heslehurst et al., 2015). The need for sensitive implementation of guidelines became apparent as midwives reported seemingly thoughtless approaches (Flannery et al., 2019; Lucas et al., 2020). One midwife reported: *"I actually say it straight out to them when I am scanning, look unfortunately you carry the extra adipose tissue I am finding it difficult, there is too much fat around your abdomen which you need to watch."* (Flannery et al., 2019: 4). Despite guidelines being valued, midwives frequently noted that their consultations needed to surpass the requirements of guidelines in order to account for individual variations in risk (Heslehurst et al., 2015) and ensure effective communication when consulting women about lifestyle (Furness et al., 2015).

A major factor hindering weight management conversations was time and workload as reported by midwives in 24 papers. Five papers specifically highlighted competing priorities (Asefa et al., 2020; Lucas et al., 2020; McLellan et al., 2019; Okafor and Goon, 2021; Wennberg et al., 2015). One interview study reported perceived lack of importance (Goldstein et al., 2020), and this was the fourth largest barrier reported across quantitative studies with a mean response of 10% (de Jersey et al., 2019).

Midwives had developed personal repertoires of skills and approaches to weight management. Some skilfully tailored information to enhance women's motivation. This encompassed several methods including i) accentuating the health benefits for the baby (Heslehurst et al., 2015; Olander et al., 2019; Rundle et al., 2018; Wennberg et al., 2014), ii) appealing to women's desire to be a role model for the baby (Wennberg et al., 2014) and iii) adapting counselling to individual needs (Arrish et al., 2017; Asefa et al., 2020; Beulen et al., 2021; Dayyani et al., 2021; Lucas et al., 2020; McParlin et al., 2017; Pan et al., 2015; Roberts, 2016; Strömmer et al., 2021), concerns (Lindqvist et al., 2014; McLellan et al., 2019) and current lifestyle patterns (Murray-Davis et al., 2020; Pan et al., 2014; Wennberg et al., 2014). Furthermore, some midwives encouraged women to devise their own strategies to manage their weight more effectively (Olander et al., 2019; Pan et al., 2014).

Midwives advocated a holistic approach in which they considered the wider factors that can influence weight. This was evident in their emphasis on wellness instead of weight (Dayyani et al., 2021; Morris et al., 2017); a sentiment echoed in discussion of weight with women of all BMI categories (Holton et al., 2017). It is possible that the latter approach may help to destigmatise the topic of weight. Other midwives included family or partners in consultations to enhance social support for women's lifestyle changes (Olander et al., 2019; Wennberg et al., 2014): *"Yes, at least in the beginning, when they come to the booking appointment and this extra visit, I think that sometimes you can focus on the whole family, including him, and many are very interested in it"* (Olander et al., 2019: 84). Family involvement was a potential approach to overcoming barriers to change (Furness et al., 2015; Hazeldine, 2018; Lindqvist et al., 2014; Stuart et al., 2016).

In addition to involving significant others in the quest for healthy weight management some midwives used wider resources including i) practical information for women (Beulen et al., 2021; Guthrie et al., 2020; Hodgkinson et al., 2017; Okafor and Goon, 2021; Pan et al., 2015; Rundle et al., 2018; Strömmer et al., 2021; Söderström et al., 2022), ii) access to a dietician (Arrish et al., 2017; Christenson et al., 2020; Fieldwick et al., 2014; Hazeldine, 2018; Pan et al., 2015), iii) midwives who specialise in obesity (Doughty, 2019) and iv) group-based support for women living with obesity (Kominiarek et al., 2015). Midwives reported lack of woman focused resources (Beulen et al., 2021) and alluded to a need for more effective partnerships with other professionals such as psychologists (Christenson et al., 2018), obstetricians (Arrish et al., 2017) and colleagues within weight management services; they reported limited feedback on women's progress following referral (Atkinson et al., 2017; Guthrie et al., 2020). This is illustrated below, when referral to other services was possible, outcomes were not always satisfactory: *"We do have access to a psychologist for pregnancy-related problems but if you have a disordered eating pattern the psychologist dismisses it and says it is not her task because the problem was there before the pregnancy."* (Christenson et al., 2018: 5)

Nine midwife-focused interventions are described in included papers. Underpinning theories include Theory of Planned Behaviour (Hart et al., 2018; Hazeldine, 2018) and Social Cognitive Theory (Heslehurst et al., 2021; Lawrence et al., 2020). In addition, some interventions involved Motivational Interviewing (MI) (Basu et al., 2014; Sanders et al., 2020). An intervention to help midwives support behaviour change ("Healthy Conversation Skills") resulted in midwives being more able to address sensitive subjects without causing offence and enhanced perceived ability to address barriers (Lawrence et al., 2020). Similarly, following an MI based intervention midwives reported they knew better how to communicate with women and colleagues (Lindhardt et al., 2015). Another MI based intervention led to improvements in knowledge and confidence in 97% and 83% respectively (Basu et al., 2014). In contrast other midwives described a lack of recognition of and tailoring to their current knowledge in MI training (Sanders et al., 2020). Furthermore, training did not always take account of their current knowledge and skills (Hart et al., 2018; Sanders et al., 2020). Positive outcomes were achieved in the "5As" intervention with knowledge increasing in 87% and confidence in 89% of those attending the forty-minute workshop (de Jersey et al., 2018). In all intervention studies, findings must be taken with caution. Evaluations were conducted soon after the training and give no indication of whether increased knowledge and confidence translate into changes in practice.

## Discussion

This mixed methods review aimed to establish midwives' experiences, challenges and identify interventions relating to GWG. 57 papers were included and three overarching themes were generated; i) emotion and weight, ii) ability to influence and iii) practical challenges and strategies for success. Weight was consistently described as a sensitive topic. Challenges included level of expertise and comfort, perceptions of ability to influence and an awareness of incongruence of their own weight and the advice they are delivering. Further barriers included varied knowledge and skills, feelings of frustration generated by working against societal norms, lack of time and resources and competing priorities. Interventions were generally theoretically underpinned and evaluated well with some self-reports of improved knowledge and confidence. However, there was no evidence of impact on practice or GWG.

There was some evidence for conflicting findings across midwives' accounts. For instance, midwives' concerns with offend-

ing women contrasted with the use of a direct approach or assignment of personal responsibility amongst others. It is possible that these findings stem from narratives surrounding individual responsibility regarding weight, which can either lead to felt (Williams and Annandale, 2018) or enacted stigma (Phelan et al., 2015). In addition, the finding that midwives regarded weight as a sensitive topic is consistent with a previous review of women's and health professionals' views of weight management during pregnancy (Johnson et al., 2013). Conversely, other midwives demonstrated empathy and an understanding of the cultural norms and socio-economic factors that influenced women's experiences of weight management.

Whilst some midwives showed enhanced levels of confidence through strategies such as tailoring their advice to women's needs, others expressed a need for further guidance in the communication of weight. This may reflect local variations in guidelines to support healthy GWG weight across NHS Trusts in England (Goddard et al., 2023). Another central theme was the diverse reactions that midwives encountered when advising or supporting women with their weight. For instance, some midwives reported cases in which women showed a lack of awareness of their weight, whilst others conveyed a sense of ease in discussing weight and lifestyle that was fostered by the rapport that they had developed with women. The latter reinforces the value of woman-centred care in facilitating effective communication about weight (Fair et al., 2022; Jones and Jomeen, 2017).

Our review was rigorously conducted following the planned methodology, inclusive, comprehensive and effectively integrates qualitative and quantitative findings. Our search and screening process was thorough and transparent, however as with all searches it is possible that we have not identified all relevant papers. The quality of included papers was generally good however, although reported interventions were well evaluated, follow-up times were short and evidence of change in practice or outcomes was absent.

Our review extends the findings of a previous review investigating communication between healthcare professionals and pregnant women with obesity or who were overweight (Dieterich and Demirci, 2020). Our focus was on midwives as primary care givers in pregnancy and we extended breadth to women in all weight categories. We also considered midwives' experiences and interventions offered to support best practice. Similarities in findings included discomfort and low confidence in weight related conversations. The authors suggest midwife training to address the issue, whilst our review offers a more nuanced understanding about interventions to improve care.

The challenges to midwives in relation to advising on exercise and diet are common in relation to advising on other health behaviours. For example, when giving advice about drinking alcohol, midwives identify challenges such as lack of guidance or knowledge (Ordean et al., 2020; Schölin et al., 2021; Smith et al., 2021). As with diet and exercise advice, they often lack the skills (Oni et al., 2020; Schölin et al., 2021; Smith et al., 2021) and confidence to engage in such conversations and are concerned about the possibility of offending women (Göransson et al., 2004; Schölin and Fitzgerald, 2019; Winstone and Verity, 2015). Some thought consultations about alcohol were not part of their role (Schölin and Fitzgerald, 2019; Smith et al., 2021; Tough et al., 2005). Similar challenges are reported in a review of qualitative studies relating to midwives advising on smoking. Perception of role responsibility, skills and ability to communicate whilst maintaining positive professional relationships with women were potential barriers (Flemming et al., 2016).

Understanding and addressing these challenges is critical given pregnancy is consistently recognised as a life-stage when women may be more attuned to changing their health behaviours (Olander et al., 2016; Olander et al., 2018). However, as illustrated

above, expectations of change can be multiple including adjustments to diet, exercise, alcohol consumption and smoking. The majority of interventions include in our review to support midwives were tailored to their needs and challenges (exception de Jersey et al., 2018) but did not necessarily recognise their existing tacit knowledge. Furthermore, it appears that the focus was on enabling midwives to provide a one-way transfer of knowledge from themselves to women with the expectation women will have sufficient motivation and ability to make recommended changes, and that such changes if enacted will impact outcomes (Olander et al., 2018). Only two interventions to support midwives included skills to allow them to tailor input according to the specific needs of women (Lawrence et al., 2020; Othman et al., 2020). Knowledge mobilisation involves moving evidence to where it can be most useful (Ward, 2017), which recognises the fluid, dynamic process of knowledge exchange (Ward et al., 2012). No intervention was co-produced with midwives, women or their families. Evidence suggests the inclusion of end-users results in improved uptake (Greenhalgh et al., 2016).

We recommend that future research is underpinned by knowledge mobilisation methods to promote shared understanding and language between women, midwives and the wider society (Cowdell et al., 2020). Partnership working and co-creation are essential to ensure knowledge about maternal weight gain is effectively shared across communities to catalyse change (Wye et al., 2019). In the interim our review suggests need for holistic, honest conversations between midwife and pregnant woman about GWG.

## Funding sources

SR is funded by a Graduate Research and Teaching Assistant (GRTA) doctoral training grant at Birmingham City University. This review will contribute towards the thesis.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Ethical approval** – not applicable

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.midw.2023.103750](https://doi.org/10.1016/j.midw.2023.103750).

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### **3.3 Women's experiences of interventions to prevent excessive GWG**

An initial search revealed that reviews of women's experiences of GWG (Vanstone et al., 2017) and support with weight in antenatal care (Saw et al., 2021) had already been conducted. Nevertheless, it was important to explore the experiences of pregnant women in relation to interventions to prevent excessive GWG, since this would inform the boundaries of acceptability for the final co-designed strategy to support midwives.

This review identified 29 papers, and revealed the following three themes: i) intervention qualities valued by women, ii) challenges faced by women, and iii) perceived benefits and recommendations for modifications. Examples of beneficial intervention components included the interpersonal approach of practitioners and social support from peers, family, and friends. Challenges included personal and external barriers such as pregnancy-related symptoms and conflicting advice from friends and family. However, some benefits were apparent, including shifts in knowledge and thinking and positive emotions.



# A Systematic Review of Women's Experiences of Interventions to Prevent Excessive Gestational Weight Gain

Sereena Raju, Fiona Cowdell & Judith Dyson

## ABSTRACT

**Objective:** To synthesize research on women's experiences of interventions to prevent excessive gestational weight gain.

**Data Sources:** A systematic search of the following databases was conducted: CINAHL Complete, Maternity and Infant Care Database, American Psychological Association PsycArticles, American Psychological Association PsycInfo, and MEDLINE.

**Study Selection:** Studies were included if they involved primary research regarding the experiences of women who were pregnant or up to 1 year postpartum when reflecting on their involvement in interventions to prevent excessive weight gain during pregnancy. Nonempirical studies and those that examined the experiences of women who were not pregnant or who were beyond 1 year postpartum were excluded.

**Data Extraction:** Information was extracted and captured in a summary table that included the study aim, participants, study

design, intervention, findings, and summary score, with exceptions to quality.

**Data Synthesis:** Data were synthesized thematically into three themes: (a) *Intervention Qualities Valued by Women*, (b) *Challenges Faced by Women*, and (c) *Perceived Benefits and Recommendations for Modifications*.

**Conclusion:** Interventions intended to help women prevent excessive gestational weight gain should be tailored to individuals' unique needs to ensure that the interventions are acceptable and effective.

doi: [10.1016/j.nwh.2022.12.004](https://doi.org/10.1016/j.nwh.2022.12.004)

Accepted March 8, 2023; published online April 17, 2023

**KEYWORDS:** gestational weight gain, intervention, obesity, pregnancy, systematic review, weight counseling



## CLINICAL IMPLICATIONS

- Interventions to help prevent excessive gestational weight gain should provide women with sufficient guidance that is tailored to their individual needs.
- Providers of interventions should address the internal and external barriers that women face, such as their lack of time or anxieties about weight monitoring.
- Interventions should incorporate women's preferences for alternative strategies such as partner inclusion and a holistic approach that addresses mental and overall maternal health.

The risks associated with excessive gestational weight gain (GWG) are well established and include a greater risk of gestational diabetes (Lan et al., 2020; Peng et al., 2021), pregnancy-related hypertension (Institute of Medicine, 2009; Macdonald-Wallis et al., 2013), and cesarean birth (Johnson et al., 2013; Reis et al., 2019). Longer-term outcomes may include cardiovascular disease (Hutchins et al., 2022), postpartum weight retention (Linne et al., 2004) and childhood obesity in offspring (Wan et al., 2018). Therefore, there is a need for effective interventions to prevent excessive weight gain during pregnancy.

Pregnancy is an ideal life stage during which to encourage positive lifestyle behaviors (Olander et al., 2018; Phelan, 2010). Researchers conducted a review of the outcomes of interventions to prevent further GWG in women who are already overweight or obese (Aung et al., 2022). The authors found that the impact of lifestyle interventions was mixed but that there was value to interventions including a psych-behavioral component and that the role of the midwife was essential. Hamilton et al. (2018) reviewed randomized controlled trials (RCTs) that examined women's experiences of weight and lifestyle interventions. The majority of studies explored changes in women's dietary behaviors and attitudes toward GWG. However, there was less emphasis on assessing acceptability from an individual's perspective. The authors concluded that future interventions should be holistic (addressing broader influences, such as a woman's partner) and acceptable to women and their families (i.e., could be followed in daily life).

Researchers who have conducted existing reviews offer some direction in supporting healthy GWG, but their work is

limited by a focus on women who already have overweight or obesity and a predominant emphasis on RCTs. There remains a need to capture experiences from pregnant women of all weights who participate in a broad range of research, not just RCTs. Therefore, our aim with this mixed-methods systematic review was to explore women's experiences of interventions to prevent excessive GWG. Our hope is that the findings will help inform the development of acceptable and effective interventions.

## Methods

This review followed the Joanna Briggs Institute (JBI) methodology for mixed-methods systematic reviews (Lizarondo et al., 2020). This involved a convergent integrated approach in which quantitative and qualitative data from primary research studies were extracted, appraised, and synthesized simultaneously. In addition, textual descriptions of quantitative results were produced to ensure integration with qualitative data. Included studies were subject to quality appraisal.

## Search Strategy

The following databases were searched using the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) methodology (Page et al., 2021): CINAHL Complete, Maternity and Infant Care Database, American Psychological Association PsycArticles, American Psychological Association PsycInfo, and MEDLINE. See Box 1 for the search strategy, which included terms related to the study population, exposure, and outcome of interest. Specifically, these combined terms related to pregnancy, interventions, healthy weight management, and experiences. Studies were included if the interventions placed an emphasis on gestational weight management irrespective of the strategy used. Specific inclusion criteria included the following: (a) studies of women who were pregnant or up to 1 year postpartum when experiences were assessed, (b) empirical papers that were peer reviewed, (c) studies published from 2012 to 2022 to ensure an inclusive yet contemporary overview, and (d) studies published in the English language. Studies were excluded if they involved any of the following: (a) women who were not pregnant or who were beyond 1 year postpartum, (b) nonempirical papers (e.g., editorials and opinion papers), and (c) interventions that were implemented before pregnancy. Backward and forward citation searches of included studies were also conducted. This involved screening reference lists and identifying articles that cited the included articles.

## Study Selection

Titles and abstracts were screened against the inclusion and exclusion criteria by authors S.R. and F.C. Studies that met the inclusion criteria at this stage were subject to full-text review by authors S.R. and J.D. Any disagreements were resolved by the full author team. Figure 1 provides a PRISMA summary of the number of studies that were identified at each stage.

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## BOX 1 SEARCH TERMS USED ACROSS DATABASES

pregna\*  
AND  
interven\* or strateg\* or service\*  
AND  
obes\* or weight or diet or nutrition\* or physical activity or exercise  
AND  
experience\* or view\* or perspective\*

## Data Extraction and Quality Assessment

Data were extracted to a summary table capturing the aim, participants, study design, intervention, findings, and quality appraisal (summary score and exceptions to quality; see [Supplementary Table S1](#)). Quality was assessed using JBI appraisal tools ([Moola et al., 2017](#)) relevant to the study design. The tools involved an assessment of the methodologic quality of studies and the extent to which bias was addressed in the design, implementation, and analysis. These consisted of checklists regarding whether a series of criteria were “met” or “not met” or if these were “unclear” or “not applicable.” A summary score (based on the number of relevant criteria that were met) was produced for each study, alongside descriptions of any exceptions to quality.

## Analysis

Qualitative data were analyzed thematically ([Clarke et al., 2015](#)), and quantitative data were summarized descriptively using frequencies and means and presented within themes. The overall findings are summarized in [Supplementary Table S1](#).

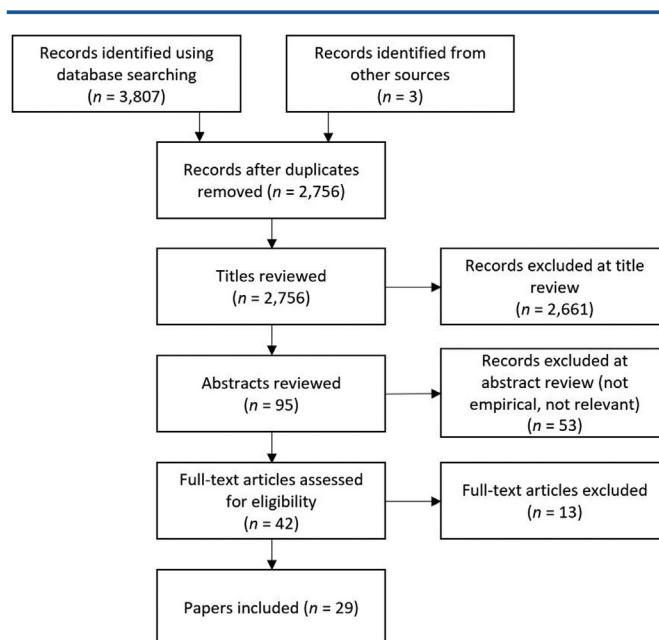
## Results

### Study Characteristics

Twenty-nine studies were included. Sixteen explored women’s experiences of interventions, nine focused on the acceptability of interventions, and the remainder ( $n = 4$ ) focused on the feasibility and/or acceptability of interventions. Although interventions often included different modes of delivery and different focuses, we report the primary facets as follows. Modes of intervention delivery included face to face ( $n = 19$ ), Web- or app-based ( $n = 6$ ), telephone ( $n = 2$ ), and self-directed ( $n = 2$ ). Content included healthy lifestyle ( $n = 29$ ). Methods used included qualitative approaches ( $n = 13$ ), surveys ( $n = 7$ ), and mixed methods ( $n = 9$ ).

Studies were conducted in Australia ( $n = 8$ ); the United Kingdom ( $n = 7$ ); the United States ( $n = 5$ ); Sweden ( $n = 3$ ); Canada ( $n = 2$ ); and Ireland, Norway, Portugal, and Greece (all  $n = 1$ ).

FIGURE 1 PRISMA FLOW DIAGRAM OF THE STUDY SELECTION AND SCREENING PROCESS



Note. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-analyses.

## Methodologic Quality

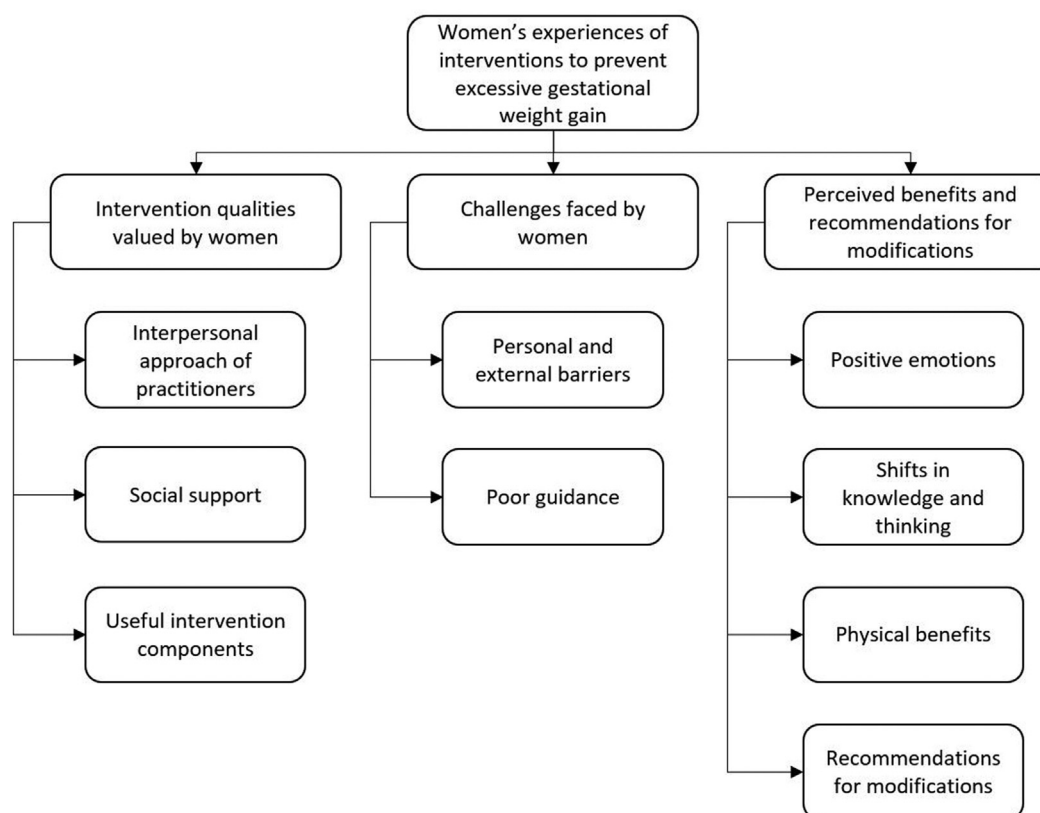
The overall methodologic quality of qualitative studies was robust. Most exceptions were the absence of underpinning philosophy and researcher positionality. The latter can form a useful component in acknowledging one’s biases and ensuring rigor in analysis ([Braun & Clarke, 2019](#)). Quantitative surveys were generally of good quality, but some had few participants (i.e., sample sizes of less than 15).

## Findings

Three themes and nine subthemes were identified (see [Figure 2](#)). The three main themes were *Intervention Qualities Valued by Women*, *Challenges Faced by Women*, and *Perceived Benefits and Recommendations for Modifications*.

**Theme 1: Intervention Qualities Valued by Women.** Intervention qualities valued by women included the following subthemes: a) *Interpersonal Approach of Practitioners*, b) *Social Support*, and c) *Useful Intervention Components*. Women reported how important the interpersonal approach of practitioners was to them; attributes that were particularly valued were a nonjudgmental stance, acceptance, and empathy ([Atkinson et al., 2016](#); [Malmström et al., 2022](#)). These approaches enabled open and honest communication ([Knight-Agarwal et al., 2015, 2022](#); [Malmström et al., 2022](#)) and facilitated a strong rapport between women and staff ([Daley et al., 2015](#); [Goldstein et al., 2021](#)). Where positive

FIGURE 2 ILLUSTRATION OF THEMES AND SUBTHEMES



interpersonal interactions were reported, all but one intervention was delivered face to face, the exception being an app-based intervention, where participants had direct contact with advisors (Knight-Agarwal et al., 2015). Women derived encouragement from the emotional support of intervention providers and individualized attention (Jarman et al., 2019; Lee et al., 2012; Malmström et al., 2022; Seward et al., 2018).

Social support was received from intervention peers and from family and friends. Group-based interventions, including classes to support physical activity (Green et al., 2021; Malmström et al., 2022), were evaluated positively. Similarly, some study authors reported that interventions led to greater support from friends or family to foster lifestyle changes (Fieril et al., 2017; Goldstein et al., 2021; Knight-Agarwal et al., 2022; Warren et al., 2017).

Women also reported the intervention components they found most useful. Personalized support, in the form of tailoring advice according to personal preferences, was key to success (Atkinson et al., 2016; Fieril et al., 2017; Goldstein et al., 2021; Jarman et al., 2019; Knight-Agarwal et al., 2022; Sandborg et al., 2021; Seward et al., 2018; Tzouma et al., 2021). The majority of participants valued personal goal setting. Similarly, regular monitoring of health behaviors (such as diet and

physical activity) was regarded positively by many (Goldstein et al., 2021; Seward et al., 2018; Warren et al., 2017).

**Theme 2: Challenges Faced by Women.** This theme included two subthemes: *Personal and External Barriers* and *Poor Guidance*. Women faced a range of personal and external barriers to effectively engaging in the interventions. Personal barriers included lack of understanding of the importance of healthy gestational weight management (Atkinson et al., 2013; Daley et al., 2015; Lee et al., 2012), anxiety about weight monitoring (Daley et al., 2015; de Jersey et al., 2019; Ferrey et al., 2021; Goldstein et al., 2021), and pregnancy-related symptoms (Ferrey et al., 2021; Goldstein et al., 2021; Lee et al., 2012; Sandborg et al., 2021; Sanders et al., 2020). In addition, some women regarded regular weight monitoring as emotionally distressing (Goldstein et al., 2021; Lawrence et al., 2020).

Practical external barriers included transport difficulties when attending sessions (Green et al., 2021; Lee et al., 2012) and lack of time (Fieril et al., 2017; Goldstein et al., 2021; Green et al., 2021; Greene et al., 2021; Kinser et al., 2019; Lee et al., 2012; Sandborg et al., 2021; Willcox et al., 2020). For instance, competing responsibilities related to

## Women reported how important the interpersonal approach of practitioners was to them

work and childcare were reported, which contributed to a perceived lack of time (Sandborg et al., 2021).

Across seven studies that provided an overall measure of how helpful or useful interventions were, most women (a mean percentage of 72%) rated interventions or guidance as helpful or useful (Carolan-Olah et al., 2021; Coughlin et al., 2020; Ferrey et al., 2021; Goldstein et al., 2021; Greene et al., 2021; Halili et al., 2018; Knight-Agarwal et al., 2015). However, poor guidance was experienced. Women reported a lack of clarity or consistency of information about ideal weight or lifestyle behaviors (Atkinson et al., 2013; Knight-Agarwal et al., 2022; Sanders et al., 2020). Others encountered a lack of clarity in guidance related to weight gain or nutrition (de Jersey et al., 2019; Sandborg et al., 2021). Similarly, some women were challenged by conflicting advice from friends or family (Fieril et al., 2017; Tzouma et al., 2021).

Relevance of guidance was also an issue. Women expressed frustration when receiving guidance that was not sufficiently tailored to their circumstances (Atkinson et al., 2013; Knight-Agarwal et al., 2015; Lee et al., 2012; Willcox et al., 2020). This was also apparent in quantitative data, where across two studies that evaluated the personal relevance of interventions, a mean of 62% agreed that Web-based interventions were tailored their needs (Carolan-Olah et al., 2021; Hayman et al., 2017).

**Theme 3: Perceived Benefits and Recommendations for Modifications.** Subthemes included the following: (a) *Positive Emotions*, (b) *Shifts in Knowledge and Thinking*, (c) *Physical Benefits*, and (d) *Recommendations for Modifications*. Across the three studies that explored satisfaction, most women (mean = 70%) enjoyed the interventions (Carolan-Olah et al., 2021; Greene et al., 2021; Haakstad et al., 2017). Positive emotions were evident when women described a sense of comfort or ease in engaging with the interventions (Atkinson et al., 2016; Daley et al., 2015; Fieril et al., 2017; Greene et al., 2021). Women reported a sense of satisfaction when they were able to engage with intervention components. Various components of information delivery were positively received. Websites and weight-tracking mobile applications were perceived as easy to use and helpful (Carolan-Olah et al., 2021; Coughlin et al., 2020).

Women also described feelings of enjoyment that were often derived from a sense of fun from physical activity when engaging in some interventions (Green et al., 2021; Malmström et al., 2022). Women reported increased confidence (Atkinson et al., 2016; Warren et al., 2017) and motivation to manage their weight effectively across interventions that included counseling or individualized guidance (Atkinson et al., 2016; Fieril et al., 2017; Goldstein et al., 2021; Knight-

Agarwal et al., 2022; Seward et al., 2018; Willcox et al., 2020), weight monitoring (Daley et al., 2015; Ferrey et al., 2021), exercise classes (Green et al., 2021; Kinser et al., 2019), and a mobile app (Knight-Agarwal et al., 2015; Sandborg et al., 2021).

Motivation was invariably linked with the health of the child (Fieril et al., 2017; Goldstein et al., 2021; Green et al., 2021; Knight-Agarwal et al., 2022; Sanders et al., 2020; Seward et al., 2018). For instance, women expressed a desire to safeguard the health of their offspring (Goldstein et al., 2021; Knight-Agarwal et al., 2022; Sanders et al., 2020; Seward et al., 2018) and were encouraged by the prospect of health benefits to their child (Fieril et al., 2017; Green et al., 2021).

There was also evidence of shifts in women's knowledge and thinking. Increased knowledge led to greater awareness of their diet and activity habits and the importance of healthy GWG (Atkinson et al., 2016; Ferrey et al., 2021; Fieril et al., 2017; Goldstein et al., 2021; Green et al., 2021; Halili et al., 2018; Lawrence et al., 2020; Sandborg et al., 2021; Sanders et al., 2020; Warren et al., 2017; Willcox et al., 2020). In particular, women valued the opportunity to reflect on their lifestyle (Lawrence et al., 2020; Warren et al., 2017). Women also experienced greater levels of clarity about safe physical activities during pregnancy (Kinser et al., 2019; Malmström et al., 2022).

Physical benefits included enhanced energy as a result of increased physical activity. Results from two interventions indicated that most participants (mean 65%) felt an increase in energy for daily activities (Haakstad et al., 2017; Santos-Rocha et al., 2022).

When reflecting on their experiences of interventions, women proposed modifications. Thoughts about the benefits of group versus individual approaches were equivocal. Some researchers reported that participants voiced a clear preference for group-based support from other pregnant women, whereas others preferred individual appointments (Atkinson et al., 2013; Halili et al., 2018; Lee et al., 2012; Willcox et al., 2020). Other recommendations from women included the need for more partner inclusion (Atkinson et al., 2016; Sandborg et al., 2021; Tzouma et al., 2021), greater frequency and/or duration of support (Atkinson et al., 2016; Kinser et al., 2019; Sandborg et al., 2021; Willcox et al., 2020), advice tailored to different cultures or weight gain trajectories (Atkinson et al., 2016; Carolan-Olah et al., 2021; Halili et al., 2018; Knight-Agarwal et al., 2015), and a holistic approach that addresses the woman's well-being (Halili et al., 2018; Knight-Agarwal et al., 2015; Sandborg et al., 2021).

## Discussion

In this review, we included quantitative and qualitative research, and we synthesized findings regarding women's experiences of interventions to prevent excessive GWG. Three



main themes were generated from the 29 included research studies: *Intervention Qualities Valued by Women*, *Challenges Faced by Women*, and *Perceived Benefits and Recommendations for Modifications*. Positive interpersonal interactions with practitioners were greatly valued by women, as was social support from peers, family, and friends. Challenges included lack of understanding, dislike of weight monitoring, issues of time and travel, and poor guidance. Intervention benefits included increased confidence and motivation as well as some enhancement in physical and mental health and well-being. Modifications should allow for the inclusion of partners, offer longer or more frequent support, be holistic, and be tailored to individual needs.

Findings from this review extend knowledge from a previous review on interventions to prevent further weight gain in women who have existing overweight or obesity when they become pregnant (Aung et al., 2022). Our focus was on women in all weight categories. We further extended the breadth of understanding beyond a review of RCTs of women's experiences of weight and lifestyle interventions (Hamilton et al., 2018) by including qualitative and quantitative appraisals. These authors' interventions, methods, and outcomes were heterogeneous. Therefore, transferability is limited.

Our findings support the recommendations that interventions should be holistic and acceptable to women and their families (Hamilton et al., 2018). Researchers who conducted a systematic review and metasynthesis of 92 studies reported women's perceptions or experiences of behavior change in pregnancy related to dietary habits, exercise, smoking, and alcohol consumption (Rockcliffe et al., 2021). These authors provide valuable insights into barriers and facilitators to change. Specifically, women tended to be driven by a desire to be seen as a good mother, with behavior being driven by securing good health for their offspring as well as by societal and personal roles and expectations. The role of social influences was perceived as a barrier and a facilitator, and the need for the provision of sound knowledge, understanding, and advice was identified (Rockcliffe et al., 2021). As

with other reviews, the need for a holistic approach is emphasized.

## Pregnancy is an opportunity to promote healthful behavior changes

Pregnancy is an opportunity to promote healthful behavior changes (Olander et al., 2016, 2018). In our review, a minority of articles explicitly indicated the use of a theoretical underpinning. There is evidence that behavior change interventions are more effective when they are underpinned by psychological/behavior change theory (Taylor et al., 2012; Webb et al., 2010) and tailored to the specific needs of the individual (Baker et al., 2015). Therefore, future intervention designers should consider a theory-based approach.

### Strengths and Limitations

The review was conducted using a prespecified methodology based on the JBI approach to mixed-methods systematic reviews (Lizarondo et al., 2020). It was inclusive and comprehensive, integrating qualitative and quantitative findings. Our search strategy and screening process were diligent and clearly described. However, as with all searches, it is possible that we may not have captured all relevant research. All included articles were of reasonable quality. Although many interventions were similar—focusing on diet, weight, and exercise—the heterogeneous nature of study methods and evaluation processes may not make the results of this review generalizable to all populations. Although intentions to change behavior are reported, robust evidence of action is absent and needs to be further explored in future research.

### Implications for Practice

Interventions to manage healthy GWG continue to proliferate. However, the evidence base remains poorly articulated. This review highlights several implications for practice. First, it is important that weight management advice be current and comprehensive. For instance, authors of recent research highlight the important role of sleep quality (Pauley et al., 2020; Pauley, Moore, Mama, Molenaar, & Downs, 2023) in gestational weight management. As such, new scientific evidence should inform the support that women receive, and strategies to promote sleep during pregnancy should be reviewed.

Second, interventions for patient-centered care should acknowledge individual needs, such as specific food cravings and the promotion of safe exercise. Furthermore, practical concerns, such as time and travel, should be addressed through the inclusion of remote methods, such as a mobile app, to decrease barriers to engagement. It is also clear that holistic support is valued greatly by women and may be achieved through partner inclusion and nurturing overall maternal health.

The importance of consistent advice underlines the value of shared understanding for women. Interventions should



capitalize on this by including women and health professionals in the design of local interventions (Walker et al., 2020). Indeed, interventions that are codesigned with the intended end users have the potential to be more useful in practice (Santin et al., 2019; Tsianakas et al., 2015).

## Conclusion

In summary, women experienced several positive outcomes as a result of their engagement in interventions to prevent excessive GWG. These included social support, positive emotions, and shifts in knowledge and thinking. However, a perceived lack of clarity in guidance and personal and external barriers were also reported. This highlights a need for interventions that are tailored to individuals' unique needs to ensure that the interventions are acceptable and effective.

## Supplementary Material

Note: To access the supplementary material that accompanies this article, visit the online version of *Nursing for Women's Health* at <http://nwhjournal.org> and at [10.1016/j.nwh.2022.12.004](https://doi.org/10.1016/j.nwh.2022.12.004).

## Author Disclosures

The authors report no conflicts of interest or relevant financial relationships.

## Funding

Sereena Raju is funded by a Graduate Research and Teaching Assistant (GRTA) doctoral training grant at Birmingham City University. **NWH**



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The first two reviews highlighted a range of contextual factors that influence the experiences of midwives and pregnant women. However, there was a need to consider nuances associated with women from minority ethnic backgrounds. This helped to ensure that the evidence that was synthesised with the interview findings was suitably tailored to midwives' consultations with South Asian women. Therefore, two subsequent reviews were conducted to explore the following for women from ethnic minority groups: i) barriers and facilitators to healthy GWG and ii) the extent to which interventions are tailored and address the barriers and promote the facilitators for weight management during pregnancy.

### **3.4 Barriers and facilitators to healthy gestational weight gain amongst pregnant women from ethnic minority groups**

Twenty-six studies were identified in this review. The following five themes were reported: i) knowledge and beliefs, ii) cultural and social influences, iii) confidence, iv) physical experiences, and v) personal and environmental factors. Themes one, four, and five aligned with the experiences of women in the second review. However, cultural and social influences were more apparent, which were exemplified in preferences for a larger body size and family pressure to consume more. Whilst the second review of women's experiences revealed increased levels of confidence in weight management following interventions, this review identified reduced confidence associated with a perceived lack of control over food intake amongst some women.

#### **Barriers and facilitators to healthy gestational weight gain amongst pregnant women from ethnic minority groups: A systematic literature review with narrative synthesis**

##### **Abstract**

*Background:* Excessive weight gain can be detrimental to the health and wellbeing of both mother and child. There is evidence that women from ethnic minority groups are more likely to gain excessive weight during pregnancy. For the purpose of this review, ethnic minority women are defined as those with different national or cultural traditions from the main population. Our aim was to identify barriers and facilitators to healthy gestational weight gain in pregnant women in ethnic minority groups.

*Methods:* Databases searched were MEDLINE, CINAHL, PsycInfo and PsycArticles between 2011 and 2023. Inclusion criteria were empirical studies of any method considering gestational weight gain in ethnic minority women published in English. Data were extracted according to aim and participants, methods, and findings in relation to barriers and



facilitators. Included papers were assessed for quality according to relevant Joanna Briggs Institute checklists.

*Results:* Twenty-six studies were identified. Five themes were revealed: (1) knowledge and beliefs, (2) cultural and social influences, (3) confidence, (4) physical experiences, and (5) personal and environmental factors.

*Discussion:* Some barriers and facilitators were relevant to all groups with others being more specific to ethnic minority groups. We therefore recommend that the barriers and facilitators identified here are considered in designing future, or adjusting current, health care practitioner mediated interventions to support healthy gestational weight gain in ethnic minority women.

*Key words:* pregnancy, maternal health, gestational weight gain, obesity, ethnicity

### **Statement of significance**

#### *Problem or issue*

Excessive weight gain during pregnancy is linked with poorer health outcomes for the mother and baby.

#### *What is already known*

Evidence suggests that women from ethnic minority groups are more likely to gain excessive weight during pregnancy.

#### *What this paper adds*

This paper summarises current findings in relation to the barriers and facilitators to healthy gestational weight gain amongst women from ethnic minority groups. Key barriers included cultural preferences for a larger body size, food norms, expectations of other household members and socio-cultural myths, e.g. that pregnancy cravings must be satisfied to prevent unpleasant incidents.

## **Introduction**

The risks associated with excessive gestational weight gain (GWG) and obesity during pregnancy are well-documented. The former includes an increased risk of caesarean birth,<sup>1,2</sup> labour induction,<sup>3</sup> and pregnancy-related hypertension.<sup>1,4</sup> Obesity during pregnancy is associated with an increased risk of neural tube defects (defects of brain or spinal cord), miscarriage or stillbirth,<sup>5</sup> gestational diabetes, pre-term delivery (before 37 weeks of pregnancy), higher birth weights, and a greater need for neonatal care.<sup>6</sup> Obesity during pregnancy has also been correlated with an increased risk of cerebral palsy in children,<sup>7</sup> lower IQ scores at age 10,<sup>8</sup> childhood asthma,<sup>9,10</sup> and childhood obesity.<sup>11</sup>

Women from ethnic minority groups in this paper are defined as those with different national or cultural traditions from the main population. They are more likely to be: (1) overweight or obese, (2) gain excessive weight, and (3) experience adverse weight related consequences. However, there are variations in the relationship between ethnicity and GWG. For instance, lower GWG is reported in Asian women in Canada whereas greater levels of GWG have been reported for Eastern European women in Norway.<sup>12</sup> Furthermore, some ethnic minority groups are more prone to the complications of GWG. For example, there is a stronger association between obesity during pregnancy and diabetes in Black and South Asian women compared with the general population.<sup>13</sup> Amongst Black women, almost double the number with neonatal macrosomia (high birth weight infant) have been estimated as attributable to obesity during pregnancy compared with the general population of women in England.<sup>13</sup> South Asian women have shown a higher prevalence of diabetes in pregnancy at a lower BMI threshold than their White counterparts in England<sup>14</sup> and Canada.<sup>15</sup> Furthermore, the absence of Asian-specific BMI thresholds in antenatal settings<sup>16,17</sup> suggests that the prevalence of obesity during pregnancy amongst these groups may be higher than standard BMI criteria suggest.<sup>18-20</sup> This highlights the need to understand ethnically specific barriers and facilitators to women achieving healthy GWG. The aim of this review is to address the question: What are the barriers and facilitators associated with healthy GWG as reported by women from ethnic minorities?

## **Methods**

A narrative review<sup>21</sup> was conducted according to (1) systematic search, (2) data extraction, (3) quality appraisal, and (4) narrative synthesis using thematic analysis.<sup>22</sup>

## **Search strategy**

This review considered studies with women from ethnic minority groups (as defined by authors and according to our definition, that is, those with different national or cultural

traditions from the main population). We included papers reporting women's barriers and facilitators to healthy GWG.

The electronic databases searched using PRISMA methodology<sup>23</sup> were American Psychological Association (APA) PsycArticles, APA PsycInfo, Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, and Medical Literature Analysis and Retrieval System Online (MEDLINE) as this combination was considered likeliest to capture all relevant papers.

The search strategy included the following terms related to the review question: (*pregna\**) AND (*attitude\* or belief or percept\* or view\* or experience\* or barrier or facilitator*) AND (*obes\* or weight or diet or nutrition\**) AND (*ethni\* or cultur\* or Asian or India\* or Pakistan\* or Bangladesh\* or Chin\* or Black or Africa\* or Caribbean or Arab\* or Latin\* or Hispanic or migra\* or minorit\* or BME or BAME<sup>1</sup>*). An initial scoping review revealed many studies did not report the ethnic category of participants in the abstract. Consequently, a full-text search was applied to the key words related to ethnic minorities. For inclusivity Office for National Statistics<sup>24</sup> terms were used alongside broad and colloquial terminology. Backward and forward citation searches of the included studies were also conducted. This involved screening the reference lists for relevant studies and identifying relevant articles that cited the included papers in Google Scholar.

## Eligibility

Table 1 provides a summary of the inclusion and exclusion criteria.

**Table 1: Inclusion and exclusion criteria**

Inclusion criteria	Exclusion criteria
Empirical studies using any method including literature reviews	Non-empirical studies (including editorials and opinion papers)
Maternal obesity/gestational weight gain	Women in the postnatal/post-partum stage
Women from an ethnic minority	
Published from 2011 – 2023 (comprehensive yet contemporary)	
Published in English language	
	Focus of paper is on medical complications

<sup>1</sup> The use of this acronym helped to ensure a comprehensive search of studies exploring the views of women from ethnic minority backgrounds. However, it remains a contested term that often masks disparities for specific ethnic groups and is no longer used in UK government (Commission on Race and Ethnic Disparities (2021) *Independent report. Summary of recommendations*. Available at: <https://www.gov.uk/government/publications/the-report-of-the-commission-on-race-and-ethnic-disparities/summary-of-recommendations> [Accessed 02/01/2024].

## **Study selection**

All identified citations were uploaded to Microsoft Excel and duplicates removed. Titles and abstracts and full texts were independently screened by two reviewers. Where there were disagreements, these were resolved through discussion with a third author. A summary of the study selection process is provided in figure 1.

## **Data extraction and quality assessment**

Data were extracted using a bespoke spreadsheet which captured the aim, participants, study design, findings, and exceptions to quality following appraisal. Table 2 summarises included studies. Eligible studies were critically appraised for methodological quality using the Joanna Briggs Institute critical appraisal tools,<sup>25</sup> namely the qualitative checklist<sup>26</sup> (including stated philosophical perspective and methods, congruity between methods and research question, analysis and results, researcher positionality and influence, representation of participant voices, ethics, and conclusion's representation of data), and the checklist for analytical cross-sectional studies<sup>25</sup> (including clarity of inclusion criteria, sufficiency of detail in description of participants and setting, validity and reliability of exposure measurement, identification of confounding factors and strategies to deal with these, and validity and reliability of outcomes measured). For comprehensiveness all studies were included irrespective of quality.

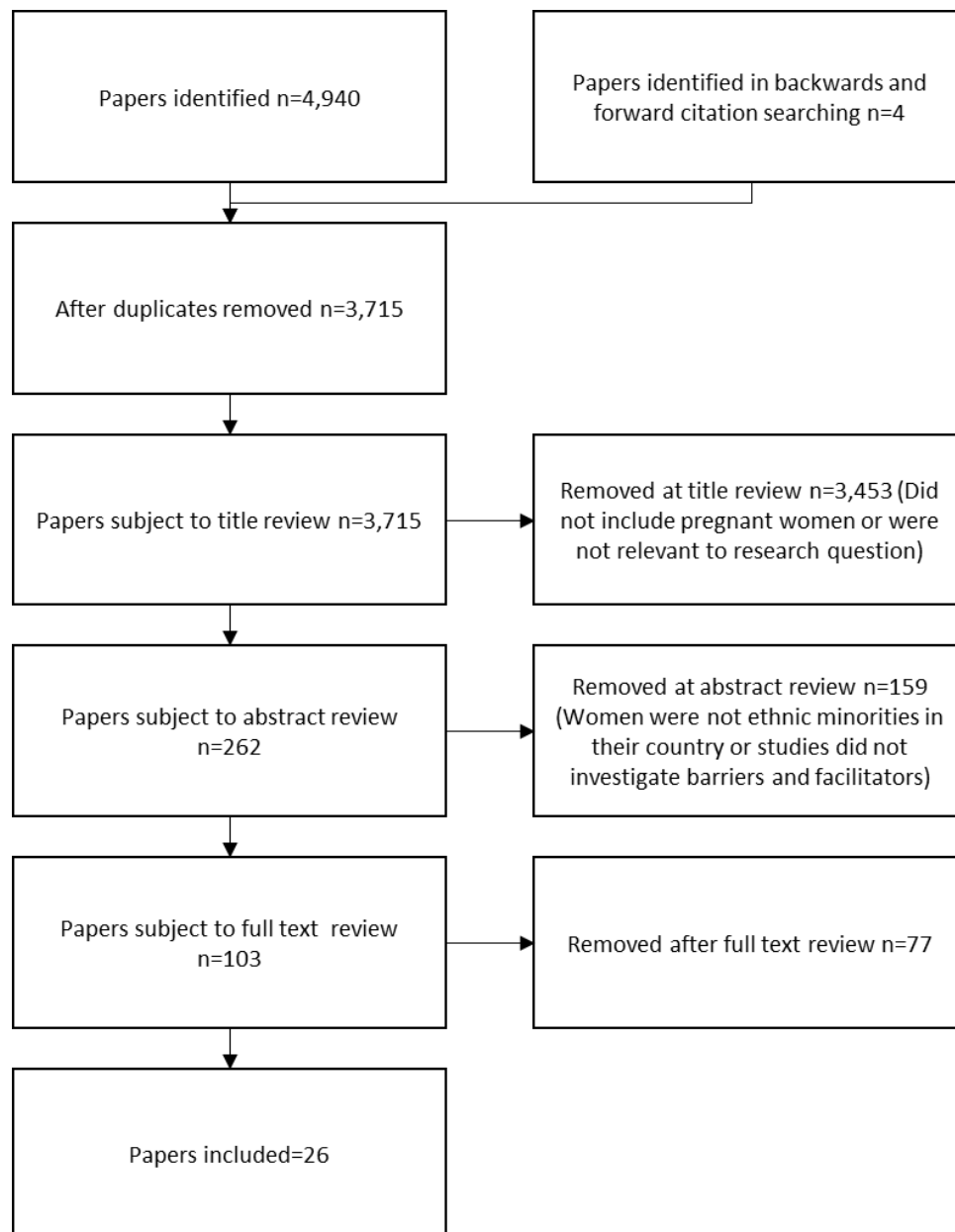
## **Analysis and synthesis of the findings**

We undertook an inductive thematic analysis of barriers and facilitators using the six stages of Braun and Clarke<sup>27</sup> (familiarisation with the data, initial code generation, searching for themes, reviewing themes, defining and naming themes, and producing the report).

## **Results**

In total 26 papers were included (see PRISMA diagram figure 1). Details relating to study characteristics, findings and exceptions are summarised in table 2.

**Figure 1. PRISMA flow diagram of the study**



### Study characteristics

Twenty-six papers were included. Studies were conducted in the USA (n=19), Canada (n=3), Singapore (n=3), and England (n=1). Most studies focused on African American women (n=10). Eight papers considered women from low-income groups. Eleven studies conducted interviews, nine used focus groups, and the remainder used a combination, with two of these including questionnaires.

### Methodological quality

The methodological quality was generally robust, although there was often a lack of explicit theoretical underpinning and reflexivity.

**Table 2: Summary of included papers**

First author (year)	Aim and participants	Methods	Findings in relation barriers (B)/facilitators (F)	Quality appraisal exceptions
Ayers <sup>28</sup> (2021)	Examine GWG beliefs. Pregnant Marshallese, USA (n=33)	Survey and semi-structured interviews	B: Lack of understanding of healthy infant size, practitioner advice and family encouragement, and difficulty in controlling food intake. F: Church and family encouragement of healthy eating/exercise, knowledge of healthy weight, concerns about the impact of excessive GWG.	8/10: Qualitative philosophy or researcher reflexivity
Darroch <sup>29</sup> (2016)	Investigate the understanding GWG. Aboriginal women. Canada (n=25)	Focus groups and semi-structured interviews	B: Belief that excessive weight gain is inevitable, normalisation of obesity in the community, lack of family encouragement to exercise, others “eat for two”, tiredness, lack of guidance from doctor, lack of culturally tailored care.	10/10
Davis <sup>30</sup> (2021)	Explore exercise perceptions. Pregnant African American /Black women USA (n=14)	Questionnaire and semi-structured interviews	B: Misinformation from friends/family, tiredness, depression, self-consciousness of body, safety concerns, unsafe neighbourhood. F: Reminders (e.g. sticky notes), enjoyment, having an exercise partner, support from friends/family, and beliefs of physical and psychological benefits. A nurse-led exercise group was viewed positively.	Questionnaire: 6/6 Interviews: 7/10: Qualitative philosophy, researcher reflexivity
Fletcher <sup>31</sup> (2018)	Explore understanding of healthy GWG. Pregnant Latina women, USA (n=50)	Focus groups	B: Lack of eating control and motivation, a belief resisting cravings will harm baby and healthy GWG not linked to baby health, partner food choices, lack of time, cultural practice of large portions, physical symptoms, negative emotions, and poor body image. F: Partner encouragement, positive beliefs, and health behaviour advice.	8/10: Qualitative philosophy or researcher reflexivity
Goodrich <sup>32</sup> (2013)	Explore the barriers and health behaviours influencing GWG, pregnant and post-partum African American women with obesity or classed as overweight. USA (n=33)	Semi-structured interviews	B: Distorted perception of optimal weight gain. Fatigue, pain, nausea, and safety concerns impacted exercise. Cravings, availability of fast/unhealthy food influenced diet. F: Safe neighbourhood, enjoyment, beliefs of easier labour impacted exercise. Beliefs about improved baby and woman health influenced diet.	9/10: Qualitative philosophy

First author (year)	Aim and participants	Methods	Findings in relation barriers (B)/facilitators (F)	Quality appraisal exceptions
Groth <sup>33</sup> (2012)	Understand weight management. Pregnant African American, low-income background women. USA (n=26).	Focus groups	B: Belief GWG will benefit baby, influenced by partners and family. Being larger a cultural norm/ considered attractive and inevitable. F: Concerns of impact of excessive GWG on appearance and ability to carry out activities.	9/10: Qualitative philosophy
Groth <sup>34</sup> (2013)	Explore exercise and nutrition during pregnancy in pregnant African American. Low-income women. USA (n=26)	Focus groups	B: Lack of energy, motivation, time, fear of harming the baby inhibited exercise. Changes in taste, appetite, cravings, lack of belief in doctor impacted diet. F: Encouragement of family and others improved exercise, perceptions of impact on baby impacted diet.	7/10: Qualitative philosophy, researcher reflexivity, not all points supported by data
Groth <sup>35</sup> (2016)	Investigate the factors affecting diet choices of pregnant, low-income African American pregnant women. USA (n=25)	Semi-structured interviews	B: Cravings, changed taste in pregnancy, time, finances, lack of understanding. F: Beliefs of benefit to baby, information from practitioners, own mother and internet.	8/10: Philosophical perspective, not all points supported by data.
Hackley <sup>36</sup> (2014)	Explore the barriers to health behaviours in pregnancy in Hispanic and Black nulliparous, pregnant and post-partum women, USA.	Questionnaire (n=43) and focus groups (FG) (n=15)	Questionnaire: Knowledge and self-efficacy scored highly but <50% engaged in diet and exercise behaviours. B in FGs: poor knowledge, physical symptoms, and lack of resources (e.g. high quality foods).	Questionnaire 6/6 Focus group 8/10: Qualitative philosophy, researcher reflexivity
Herring <sup>37</sup> (2012)	Investigate the perceptions of GWG in pregnant, low-income, African American women. USA (n=31)	Focus groups	B: Increased hunger, belief eating and high GWG healthy and beneficial for baby, lack of eating control, pressure from families to eat more, practitioner set weight targets seen as restrictive, lack of consistent advice, social influence of women's mothers over practitioners, GWG considered attractive. F: Perception of negative health outcomes for high weight gain.	9/10: Qualitative philosophy
Kandasamy <sup>38</sup> (2021)	Understand the perceptions of diet and exercise during	Semi-structured	B: Lack of time, poor advice from older relatives, cultural food practices. F: Feelings of control, advice from friends and	10/10

First author (year)	Aim and participants	Methods	Findings in relation barriers (B)/facilitators (F)	Quality appraisal exceptions
	pregnancy amongst pregnant or recently pregnant South Asian women. Canada (n=10)	interviews and focus groups	practitioners. Women suggested practitioners provide diet and exercise advice in the first trimester and raise community awareness.	
Kominiarek <sup>39</sup> (2015)	Explore the GWG perceptions and strategies in pregnant Black (n=16) Hispanic (n=2) women, USA.	Focus groups	B: Beliefs of lack of control over GWG, time (cooking), and cultural practices (e.g. family expect fried not baked). Suggestions for interventions: group-based diet and exercise support, acknowledgement of the role of mental health in GWG, and improved provider support.	7/10: Qualitative philosophy and not all points are supported with data
Krans <sup>40</sup> (2011)	Identify barriers and facilitators to exercise amongst pregnant, low-income African American women. USA (n=34)	Focus groups	B: Physical symptoms, lack of time, funds, facilities, and information about safe exercises from practitioners. Perception exercise not fitting culture. Suggestions: group-based classes to facilitate social support, affordable facilities, and childcare provision.	7/10: Qualitative philosophy, researcher reflexivity
Krans <sup>41</sup> (2012)	Explore the exercise beliefs of African American pregnant women, USA (n=34)	Focus group discussions	Although exercise during pregnancy was generally viewed as beneficial, there was a belief that some activities could cause problems.	8/10: Qualitative philosophy, researcher reflexivity
Kroeger <sup>42</sup> (2019)	Explore the reasons for late-night eating during pregnancy and solutions among low-income Black women with obesity or classed as overweight. USA (n=18)	Focus group discussions	B: Physical symptoms, "baby hunger", habit, influence of household members, time negates the need to share food with family members, convenience, and considered an appropriate time to consume sweet foods. F: Perceived risk to child.	10/10
Ku <sup>43</sup> (2022)	Understand the barriers and facilitators to engaging in a lifestyle intervention amongst pregnant Chinese (n=9), Indian (n=4) or Malay (n=2) women with obesity or	In-depth interviews	B: Time for exercise or cooking, lack of knowledge, culturally tailored information resources. F: Beliefs about health of the baby, support from family and partner, access to a peer support group, practical guidance on diet and exercises. Suggestions: a single platform/app for information on preconception, pregnancy and post-partum with reminders, classes, monitoring, support, and activities to do with partner.	9/10: Qualitative philosophy



First author (year)	Aim and participants	Methods	Findings in relation barriers (B)/facilitators (F)	Quality appraisal exceptions
	classified as overweight in Singapore			
Lau <sup>44</sup> (2018)	Gain insight into preferences for a healthy lifestyle mobile app for pregnant Malay (n=6), Indian (n=4), Chinese (n=3), other (n=1)) women with obesity or classed as overweight in Singapore.	Semi-structured interviews	Content: Culturally tailored diet plans specific to pregnancy, multiple content (diet, exercise, weight management), credible source and current information, online communication with practitioners, peer support discussion forums, weight monitoring, and food diary. Appearance: attractive, visual, user-friendly, interactive, and multimedia (e.g. videos, and quizzes)	8/10: Qualitative philosophy, researcher reflexivity
Lee <sup>45</sup> (2016)	Explore the influence and strategies for changes Central American Immigrant (CAI) pregnant (n=20) or postpartum (n=10) women make to their diet. USA	Case study (health centre) using in-depth interviews	Influencers were family (wanting to see children grow up) and beliefs of GWG risks. Strategies included capitalising on women's feeling toward family, their wish to provide the best chance for their family in a new country, and raising awareness of risks for baby.	10/10
Lindsay <sup>46</sup> (2017)	Explore first pregnancy Latina (Hispanic or Brazilian) women's experiences of communicating with primary healthcare providers about GWG and exercise. (n=23) USA	Semi-structured interviews	B: Limited advice and a lack of concern about GWG and exercise. They relied on multiple sources of information (e.g. internet, books, friends and family), and experienced discomfort when discussing weight gain with practitioners through an interpreter.	8/10: Qualitative philosophy, researcher reflexivity
Lindsay <sup>47</sup> (2019)	To explore first pregnancy Latina (Hispanic or Brazilian) women's beliefs, attitudes, and experiences of communicating with primary healthcare providers about GWG and exercise. USA (n=23)	Semi-structured interviews	B: Acceptance, uncertainty, and feelings of a lack of control re GWG. Friends and family endorsement of eating in pregnancy and socio-cultural beliefs (e.g. bad things happen if cravings are not satisfied). F: Women expressed concerns for baby's health and their appearance.	8/10: Qualitative philosophy or researcher reflexivity

First author (year)	Aim and participants	Methods	Findings in relation barriers (B)/facilitators (F)	Quality appraisal exceptions
Nagourney <sup>48</sup> (2019)	Understand the perceptions of diet and exercise amongst pregnant, obese, low-income obese African American women. USA (n=21)	Semi-structured interviews	B: Cravings for unhealthy food, appetite changes, tiredness, cost of healthy food, reliance on internet advice, and uncertainty in information sources (practitioners and internet). Self-efficacy in GWG and support of friends/family was variable. F: Baby's health and awareness of importance of healthy eating and portion sizes.	10/10
Ngongalah <sup>49</sup> (2021)	Explore the perspectives of African migrant women regarding pre- and post-migration influences on GWG. England (n=23; 5 were pregnant at the time, 9 less than 12 months post-partum and 9 over 12 months post-partum)	Semi-structured interviews	B: Fast food alluring, aggravated by bad weather (need for convenience) mitigated by high cost, influence of household, friends and relatives (sometimes positive), greater access to vehicles, lack of time, more mechanised appliances. Cultural views that exercise is sport for men and larger size is preferable. Practitioner's advice difficult to relate to cultural food practices and a conflict between African and Western exercise advice. F: Growing awareness of risks of high GWG.	9/10: Qualitative philosophy
Quintanilha <sup>50</sup> (2016)	Explore determinants of diet and exercise in Northeast African migrant women during pregnancy and post-partum. Canada (n=80)	Focus groups	B to diet: Lack of social and financial support, low-cost fast foods, lack of time, tiredness, weather prohibits growing fruit and vegetables. B to exercise: Weather, cost, lack of time.	8/10: Qualitative philosophy, researcher reflexivity
Reyes <sup>51</sup> (2013)	Explore factors influencing diet of low-income African American pregnant women who are classed as overweight. USA (n=21)	Semi-structured interviews	B: Lack of knowledge, belief eating more benefits baby, pressure from friends/ family to eat more, reduced control over food shopping due to living in multigenerational households, access to healthy food, and tiredness. F: Motivation due to beliefs about diet impact on baby.	9/10: Qualitative philosophy
Shum <sup>52</sup> (2022)	Explore views on exercise among pregnant and post-partum Malay (n=12), Chinese (n=8), Indian (n=1) and Filipino (n=1) women in Singapore.	Semi-structured interviews	B: Housework enough exercise, demanding job, physical symptoms, discouragement from family members, lack of information from practitioners, fear of harming baby, time. F: Beliefs relating to health benefits for mother and baby and easier delivery, and encouragement from friends, family, and practitioners. Suggestion – information brochure.	8/10: Qualitative philosophy researcher reflexivity

First author (year)	Aim and participants	Methods	Findings in relation barriers (B)/facilitators (F)	Quality appraisal exceptions
Wang <sup>53</sup> (2015)	Explore the factors linked with excessive GWG amongst Latina pregnant women of different pre-pregnancy BMI categories. USA (n=62)	Semi-structured telephone interviews	B: Emotional eating, low levels of control over eating, and cravings. Time, family eating patterns, conflicting advice, practitioner advice hard to follow, acceptability of high GWG, beliefs that GWG resulted in healthier pregnancies and babies, and they would lose the pregnancy weight after childbirth.	9/10: Qualitative philosophy

## Themes

The barriers and facilitators associated with healthy GWG amongst women from ethnic minorities were grouped into five themes. These were related to (1) knowledge and beliefs, (2) cultural and social influences, (3) confidence, (4) physical experiences, and (5) personal and environmental factors. Each of these are presented in turn below and summarised in figure 2.

### *Theme 1: Knowledge and beliefs*

This theme related to a lack of knowledge, uncertainty about information sources, and beliefs about the inevitability and impact of excessive weight gain relating to diet and exercise. Women reported a lack of knowledge about appropriate levels of weight gain during pregnancy<sup>32,37,47</sup> and one study revealed that some women misunderstood the meaning of BMI.<sup>49</sup> Healthcare providers' targets for weight gain were perceived as restrictive.<sup>37</sup> Some women reported receiving limited<sup>46</sup> or inconsistent or contradictory<sup>37,39</sup> guidance about healthy weight gain:

*I feel like I am gaining a lot more weight now [33 weeks pregnant], but my doctor never really says anything about my weight gain being bad. I don't ask either. If he doesn't say anything, I don't feel like asking.* <sup>46(p 6)</sup>

There was a gap in some women's knowledge around what constitutes a healthy diet and they revealed a lack of awareness of nutrition and portion sizes.<sup>35,36</sup> Some women indicated misconceptions, for example, viewing pregnancy as the right time to consume sweet foods<sup>42</sup> or that their hunger or food preferences were attributable to the baby:<sup>37,42,53</sup> "But I just can't help it. I just keep eating and eating, and then what makes it so bad is the baby never gets full".<sup>37(p 1839)</sup> A range of beliefs were expressed. For example, some adhered to the old adage that they needed to "eat for two"<sup>29</sup> and expressed a benefit of weight gain to the baby; "For me the more you gain the healthier you feel and [the healthier] the baby is. This is the only time that you can splurge."<sup>53(p 815)</sup> Weight gain was considered by some as inevitable and a product of factors such as age, hormones and genetics.<sup>33</sup> Conversely, having an awareness of the health risks associated with excessive GWG and an awareness of the importance of healthy eating and sensible portion sizes served as a facilitator of a healthy diet.<sup>45,48</sup> For example:

*I started to take them [changes] more seriously since I am pregnant again because I want everything to go well for me...if I am well my baby will be too. If I don't take care of myself there is a risk that I can pass something to my baby.* <sup>45(p 107)</sup>

Some women expressed concerns about the safety of exercise during pregnancy<sup>30,32,41</sup> whereas others reported an awareness that being active may contribute to a simpler labour<sup>30,32,52</sup> or benefit the baby's health.<sup>40,52</sup> As with diet some women reported a lack of guidance from providers about safe exercise during pregnancy.<sup>40</sup> When given, guidance on weight and exercise was generally trusted.<sup>49</sup>

When asked about content of information, women wanted examples of healthy food choices,<sup>39</sup> practical advice on managing cravings,<sup>53</sup> and a focus on healthy behaviours rather than advice on weight gain.<sup>31</sup> They wanted advice in the first trimester,<sup>38</sup> delivered by health practitioners, online, and in apps.<sup>44</sup> Whilst some women considered leaflets unsuitable,<sup>49</sup> others said these had an influence on their food choices.<sup>35</sup>

### *Theme 2: Cultural and social influences*

In some instances, there were cultural preferences for larger body sizes, particularly among families and partners of African women.<sup>33,49</sup> Similarly, some women aspired to be bigger, particularly slimmer women<sup>37</sup>: "I want some [weight] I'm all tiny. I want big boobs like everybody else".<sup>37(p 1840)</sup> In contrast other African women reported desiring a smaller body size with increasing socialisation in Western culture.<sup>49</sup> There was also evidence that women encountered social and cultural barriers to healthy dietary patterns. For example, some women felt pressure to cook fried foods, arising from South American norms and the expectations of household members.<sup>39</sup> One study with Latina women uncovered socio-cultural myths that pregnancy cravings must be satisfied to prevent unpleasant incidents.<sup>47</sup> Friends and families tended to pressurise women to eat more during pregnancy,<sup>37,47,49,51</sup> for example: "I don't force myself to eat, my mom be trying to do that. She be like, 'T—you gotta eat something'...I be like mom, it's gonna make me sick."<sup>37(p 1839)</sup> Family-level influences also included a preference for fast food or rich meals.<sup>31,42,43,51,53</sup> However, there were several instances in which women's social networks served as facilitators of healthy eating. For example, African migrant women described connections with their identity and family as reasons for traditional cooking practices,<sup>49</sup> whilst Central American immigrant women linked a healthy diet with the likelihood of seeing their children grow up.<sup>45</sup> Similarly, food choices were positively influenced by friends and family.<sup>38,42,48,49</sup> For example: "She was, like, 'No more sodas, no more sodas.' She'd see me with a soda, she would take it and she'd call my boyfriend."<sup>42(p 602)</sup>

Similar cultural and social barriers existed for exercise. These included a lack of encouragement or support from family and friends,<sup>29,40,49</sup> and their concerns about the impact on the baby.<sup>49,52</sup> For example: "They say that if a pregnant woman is doing a lot of

things, like bending down to wash things, ... walking for a long distance, it can cause miscarriage or make the baby come before time".<sup>49(p 12)</sup> Conversely, some women reported being encouraged to exercise by their family and partners<sup>30,34,38,52</sup> and the enabling effect of having an exercise partner.<sup>30,34,52</sup>

Women often regarded advice from providers as disconnected from cultural practices<sup>29,49</sup> and financial constraints,<sup>50</sup> for example: "When the midwife says eat more . . . vitamin complex or whatever . . . I don't know if my eba and egusi soup has that or not [laughs]".<sup>49(p</sup>

<sup>10)</sup> Social and cultural norms influenced what women thought would be helpful in terms of supporting healthy GWG. These included group-based classes in cooking or exercise,<sup>39,40,49,53</sup> sharing knowledge across communities to reduce pressure to eat excessively at social gatherings<sup>38</sup> and the inclusion of partners.<sup>43</sup>

### *Theme 3: Confidence*

Women described a lack of confidence in their ability to manage weight despite knowing how.<sup>47</sup> Others reported self-efficacy in managing diet or physical activity.<sup>38,48</sup> Sometimes a lack of confidence resulted from feeling a lack of control over food intake<sup>31,37,48</sup> or weight.<sup>39,47,48,53</sup> For example: "Throughout my pregnancy I have tried as much as possible to watch what and how much I eat, but no matter what I do, I keep gaining a lot of weight . . . I feel it's beyond my control." <sup>47(p 9)</sup> Some women described late-night eating with no underlying reason.<sup>42</sup> Self-consciousness about appearance led to a decline in mental health for some.<sup>30,31,47</sup> However, for others it was a motivator to exercise: "I don't want this baby weight on me, you know. I want to exercise so that's my fear about weight gain during pregnancy".<sup>33(p 7)</sup>

### *Theme 4: Physical experiences*

Women reported various physical experiences including those that were diet-related, such as cravings and changes in taste or appetite including for unhealthy food.<sup>32,34-37,48,53</sup> Fatigue was also a common barrier,<sup>50,51</sup> and was linked with a reduced motivation to make healthy food choices. Furthermore, physical experiences such as foetal movement, hunger and nausea during the day were reported as triggers of late-night eating.<sup>42</sup> Other women reported that physical symptoms such as nausea and heartburn helped to prevent over-eating and their consumption of unhealthy foods.<sup>37,51</sup> For example: "All the sodas that I drink, it brings the acid reflux. So therefore I can't drink it . . . so now I'm left to drink water"<sup>37(p 1841)</sup> and "[I used to eat] a lot of processed foods, fried foods, but now, I can't even take fried foods. I'll have heartburn for hours, and it's just horrible".<sup>51(p 1177)</sup> There was also evidence that physical symptoms hindered women's ability to remain active. Examples of

these included tiredness,<sup>29,30,32,34,38,40,48,52</sup> pain,<sup>32,40</sup> nausea,<sup>32</sup> and challenges with mental health.<sup>30</sup>

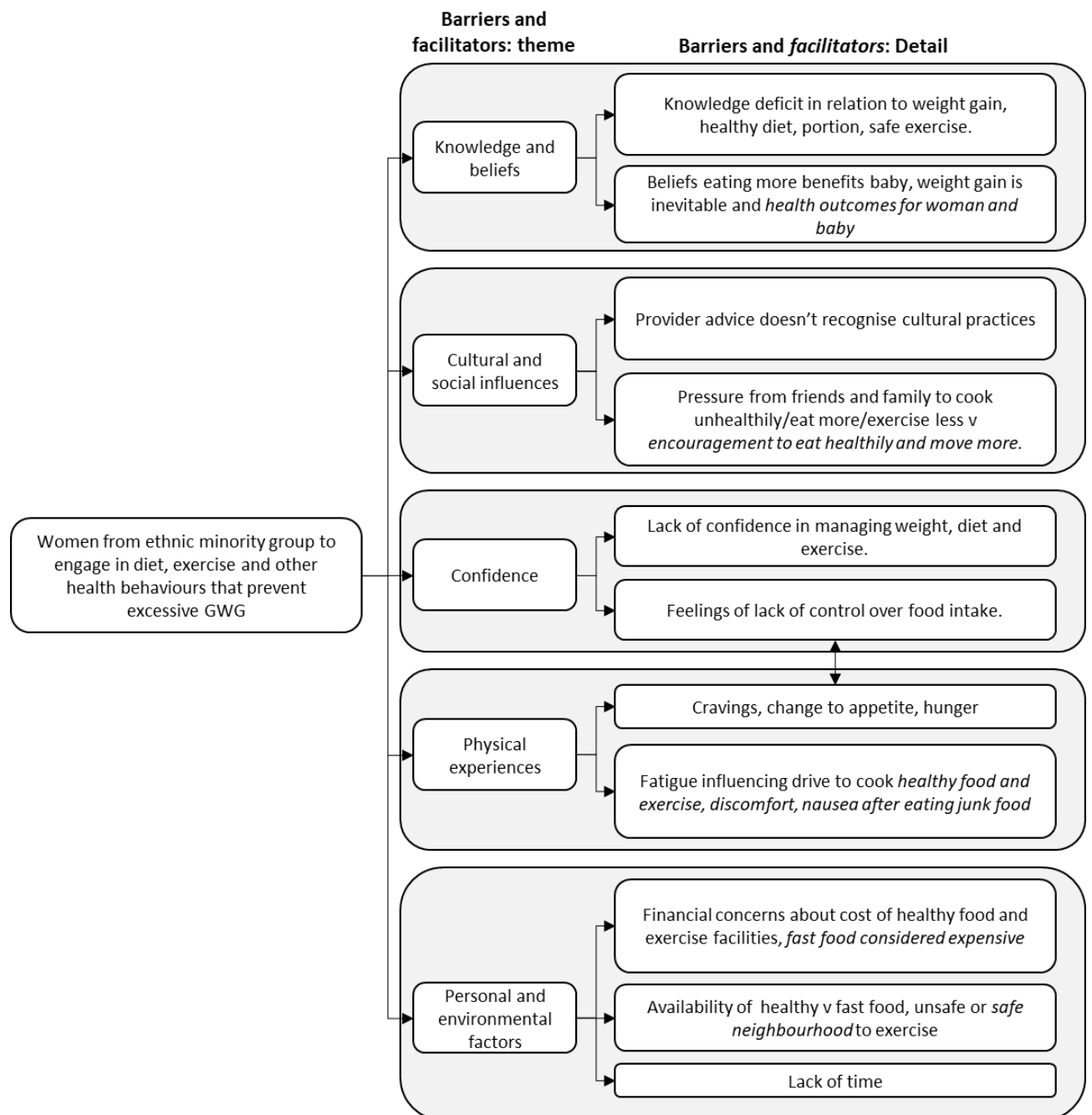
#### *Theme 5: Personal and environmental factors*

Women's personal resources often served as barriers to healthy eating. Examples of these included a lack of time to cook meals<sup>31,35,39,43,50,53</sup> and financial concerns regarding the cost of healthy food.<sup>35,48,50,51</sup> For example: "I can cook, but when I'm coming home at 9:00 at night and I gotta feed my family, we gonna stop and get something to eat if I got anything to do with it"<sup>39(p 1702)</sup> *and* "Healthy stuff adds up ... why is a double cheeseburger a dollar but a salad, five? Like wait a minute that doesn't make sense to me".<sup>48(p 2233)</sup> Conversely, others regarded fast food as a costly purchase, which prompted reduced consumption.<sup>49</sup> Physical activity was discussed in relation to similar barriers, namely a lack of time due to work and/or family commitments<sup>34,38,40,43,49,50,52</sup> and financial constraints in accessing gyms or exercise facilities.<sup>40,50</sup> Environmental barriers to healthy eating included the availability and easy access to fast food<sup>32,49,50</sup> and limited access to affordable healthy food.<sup>36,50,51</sup> Additionally, poor weather was linked with a greater need for convenience, thereby prompting fast food purchases:

*Walk like 10 or 15 min in that cold? I couldn't. There was one ummm . . . one chicken and chips shop just opposite my house . . . so, it was easy for me to just jump in there, get my food, and jump back out.*<sup>49(p 5)</sup>

Women's perceived environmental barriers to physical activity included limited neighbourhood facilities,<sup>40</sup> concerns about community safety,<sup>30</sup> and the weather<sup>29,49,50</sup>: "And in my neighborhood, half our equipment don't work ... It's like they want to trick you. Plus, there's nowhere to walk to. There's no parks no more".<sup>40(p 784)</sup> Some women cited living in a safe neighbourhood and the availability of parks as facilitators of being physically active.<sup>32</sup> African American participants suggested a need for more affordable exercise facilities, ideally with childcare available.<sup>40</sup>

**Figure 2. Summary of barriers and facilitators**





## Discussion

This narrative review is the first to have systematically identified published barriers and facilitators to healthy GWG in ethnic minority groups. We included 26 papers and methodological quality was generally robust. Key themes were (1) knowledge and beliefs, (2) cultural and social influences, (3) confidence, (4) physical experiences, and (5) personal and environmental factors. Some barriers and facilitators were likely to be relevant to wider groups of women. However, some are pertinent predominantly to women from ethnic minorities – particularly the social and cultural influences of family groups and practices, and lack of cultural tailoring of information relating to food.

There are two previous literature reviews relating to GWG in ethnic minority groups. The first considered attitudes to weight management during pregnancy but was limited to Black African women living in high-income countries.<sup>54</sup> The second investigated diet and physical activity amongst pregnant women and those of childbearing age who have migrated from African to high-income countries.<sup>55</sup> Again, the focus was on African women; only four included pregnant women and of these only one considered barriers or facilitators.<sup>50</sup>

There were strengths and limitations to our review. It was conducted using the pre-specified methodology, was inclusive and comprehensive, and our search strategy and screening process was diligent. However, as with all searches, it is possible we may not have captured all relevant papers. Included papers were of good quality. This additional understanding of the experiences of women from ethnic minority groups may be transferable to other comparable preventative health behaviours.

We know that theoretically underpinned interventions<sup>56</sup> that are tailored to address assessed barriers and optimise identified facilitators<sup>57</sup> are more likely to be effective than those that are not. We therefore recommend that the barriers and facilitators identified here are considered in designing future, or adjusting current, health care practitioner mediated interventions to support healthy GWG in ethnic minority women.

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### **3.5 Interventions to support healthy GWG amongst pregnant women from ethnic minority groups**

Twenty-one studies were identified in this review. The majority of interventions focused on the provision of information, with less attention provided to the previously identified barriers relating to confidence, physical experiences, and personal and environmental factors. This highlights a need for interventions that specifically address the barriers and promote the facilitators identified by women from ethnic minority groups.

#### **Abstract**

*Introduction:* Excessive weight gain during pregnancy can be harmful to both mother and child. There is evidence that women from ethnic minority groups, those with different national or cultural traditions from the main population, are more likely to gain excessive weight during pregnancy. Interventions to support optimal health behaviours are more effective if

they are theoretically underpinned and tailored to assessed barriers and facilitators.

Therefore, the aim of this review was to consider: What interventions have been delivered to pregnant women from ethnic minority groups, are they theoretically underpinned and tailored, and are they effective?

*Methods:* Databases searched were MEDLINE, CINAHL, PsychInfo and PsychArticles between 2011 and 2023. Inclusion criteria were empirical studies, interventions to address obesity during pregnancy or support healthy gestational weight gain, and women from ethnic minority groups published in English language. Data were extracted according to aim, methods, intervention description, and impact. Quality appraisal was according to relevant Joanna Briggs Institute checklists. A narrative review was conducted using framework analysis and quantitative data are included in the narrative.

*Results:* Twenty-one studies were identified. Outcomes considered were grouped as assessment of (1) lifestyle knowledge and behaviours, (2) clinical outcomes, (3) mental health and wellbeing, and (4) evaluation/satisfaction. Interventions primarily provided information on diet, exercise, and weight and nearly half were culturally tailored. Some studies reported significant changes in knowledge. Fewer reported changes in dietary practices and exercise.

*Discussion:* When mapping interventions to reported barriers and facilitators, the focus tended to be on provision of information. Little attention was paid to previously identified barriers relating to confidence, physical experiences, and personal and environmental factors. This review has resulted in identification of barriers and facilitators addressed and neglected in interventions designed to promote healthy gestational weight gain in ethnic minority groups.

*Key words:* maternal obesity, gestational weight gain, ethnicity, theoretical domains framework, health behaviour change

## **Statement of significance**

### *Problem or issue*

Pregnant women from ethnic minority groups are more likely to gain excessive weight during pregnancy, which can be harmful to both mother child.

### *What is already known*

Theoretically underpinned tailored interventions are more likely to be effective in changing health behaviours.

### *What this paper adds*

This review has identified barriers and facilitators addressed and neglected and provides a clear direction for amending existing and developing new interventions to support healthy gestational weight gain.

## **Introduction**

Excessive gestational weight gain (GWG) is associated with well-documented risks including an increased risk of caesarean birth,<sup>1,2</sup> labour induction,<sup>3</sup> and pregnancy-related hypertension.<sup>2,4</sup> Risks of obesity during pregnancy include neural tube (brain or spinal cord) defects, miscarriage or stillbirth,<sup>5</sup> gestational diabetes, premature delivery, higher birth weights, and increased admission of the new-born to neonatal care.<sup>6</sup> Obesity during pregnancy has also been linked with an increased risk of cerebral palsy in children,<sup>7</sup> lower IQ scores,<sup>8</sup> childhood asthma,<sup>9,10</sup> and childhood obesity.<sup>11</sup>

For the purpose of this paper, we define “ethnic minority” as those with different national or cultural traditions from the main population. Being overweight, obese or gaining excessive weight during pregnancy, along with adverse weight related consequences are more common in women from ethnic minority groups. Evidence suggests women from ethnic minorities are more prone to obesity during pregnancy and excessive GWG<sup>12,13</sup> and associated complications such as diabetes and neonatal macrosomia (high birth weight infant).<sup>14</sup>

Optimal health behaviours can be difficult for individuals to adopt and sustain as they are determined by multiple factors. Interventions to support health behaviours need to be theoretically underpinned<sup>15</sup> and tailored to identified determinants (barriers and facilitators) (Raju et al., unpublished data, 2023) to be effective. Theoretical underpinning is often by way of models of health behaviour or behaviour change. Published models have been synthesised into one, eleven domain framework (the Theoretical Domains Framework (TDF); *knowledge, skills, social role and identity, beliefs about capabilities, beliefs about consequences, motivation and goals, memory, attention and decision processes, environmental context and resources, social influences, emotion and action planning*).<sup>16</sup> By understanding factors that influence health behaviours, strategies (known as behaviour change techniques (BCTs)), can be delivered to individuals, groups or the public to support desirable health behaviours. Our recent review of barriers and facilitators to healthy GWG (Raju et al., unpublished data, 2023) identified five themes which fit within the domains of the TDF as follows (1) knowledge and beliefs (*knowledge and beliefs about consequences*), (2) cultural and social influences (*social influences*), (3) confidence (*beliefs about capabilities*),



(4) physical experiences (*emotion and knowledge*), and (5) personal and environmental factors (*environmental context and resources*). Some barriers and facilitators were likely to be relevant to all whereas others were ethnicity specific. For example, there were some cultural preferences for a larger body size, dietary expectations and norms from other family members and culturally specific myths, for example, pregnancy cravings must be satisfied to prevent harm to the baby. Furthermore, women often regarded advice from practitioners as disconnected from cultural practices (Raju et al., unpublished data, 2023). Therefore, the aim of this review was to consider: What interventions have been delivered to pregnant women from ethnic minority groups, are they theoretically underpinned and tailored, and are they effective?

## **Methods**

A narrative review was conducted through systematic search, data extraction, quality appraisal, and framework analysis of qualitative data.<sup>17</sup> Quantitative data were included in the narrative.

## **Search strategy**

We included studies in which women from ethnic minority backgrounds, those with different national or cultural traditions from the main population comprise at least 85% of the sample. The scope of papers included those reporting on interventions to address GWG or obesity during pregnancy amongst pregnant women. The electronic databases searched using PRISMA methodology<sup>18</sup> were American Psychological Association (APA) PsycArticles, APA PsycInfo, Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, and Medical Literature Analysis and Retrieval System Online (MEDLINE).

The search strategy included the following terms related to the review question: (*pregna\**) AND (*interven\* or care or attitude\* or belief or percept\* or view\* or experience\**) AND (*obes\* or weight or diet or nutrition\* or “physical activity” or exercise or lifestyle*) AND (*ethni\* or cultur\* or Asian or India\* or Pakistan\* or Bangladesh\* or Chin\* or Black or Africa\* or Caribbean or Arab\* or Latin\* or Hispanic or migra\* or minorit\* or BME or BAME*). An initial scoping review revealed that many studies did not report the ethnic category of participants in the abstract. Consequently, a full-text search was applied to the synonyms relating to ethnic minorities. Office for National Statistics<sup>19</sup> terms were used with commonplace and colloquial terminology to ensure maximum inclusivity. Backward and forward citation searches of the included studies involved screening the reference lists and identifying articles that cited the included papers in Google Scholar.

## Eligibility

Table 1 provides a summary of the inclusion and exclusion criteria.

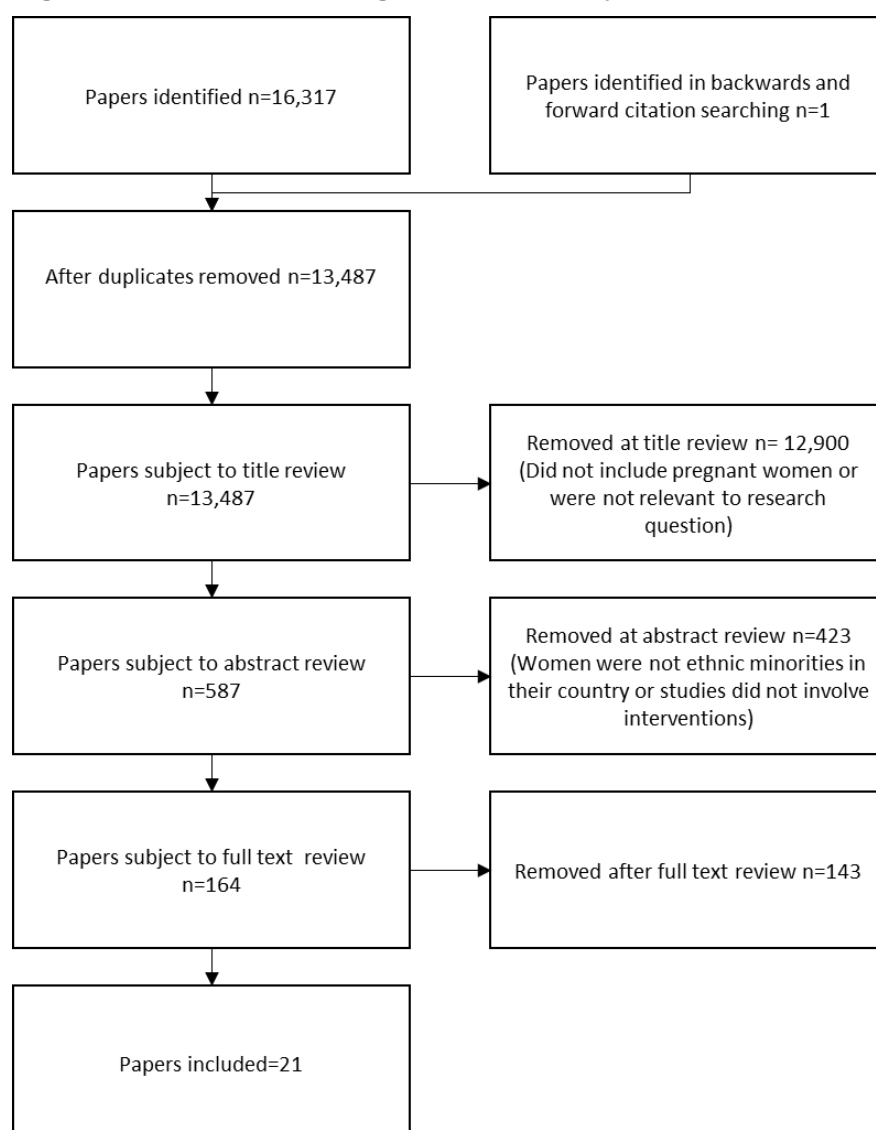
**Table 1: Inclusion and exclusion criteria**

Inclusion criteria	Exclusion criteria
Empirical studies using any method including literature reviews	Non-empirical studies (including editorials and opinion papers)
Interventions to address obesity during pregnancy/gestational weight gain	Women in the postnatal/post-partum stage
Women from an ethnic minority comprise at least 85% of the sample	
Published from 2011 – 2023 (comprehensive yet current)	
Published in English language	

## Study selection

Titles (SR and FC), abstracts (SR and JD) and full texts (SR and FC) were independently screened by two reviewers. Where there were disagreements, these were resolved through discussion with the third author. A summary of the study selection process is provided in figure 1.

**Figure 1. PRISMA flow diagram of the study**



### **Data extraction and quality assessment**

Data were extracted to a bespoke spreadsheet capturing aim, participants, study design and intervention (including components), findings, and exceptions to quality following appraisal. Eligible studies were critically appraised for methodological quality using the appropriate Joanna Briggs Institute critical appraisal tool.<sup>20</sup> Checklists involved an assessment of whether a series of criteria were “met”, “not met”, or if this was “unclear” or “not applicable”. A summary score (based upon the number of relevant criteria that were met) was produced for each study, alongside descriptions of any exceptions to quality. For instance, randomised controlled trials were assessed against thirteen criteria<sup>21</sup> that included whether allocation to treatment groups was concealed and if treatment groups were similar at baseline. Other checklists included those for cohort studies (eleven items),<sup>20</sup> quasi-experimental studies

(nine items),<sup>21</sup> and analytical cross-sectional studies (eight items).<sup>20</sup> Table 2 summarises included studies. Intervention reporting was assessed using the template for intervention description and replication (TIDieR) checklist<sup>22</sup> (table 3). All studies, regardless of the results of their methodological quality, underwent data extraction and synthesis to ensure comprehensiveness.

### **Analysis and synthesis of the findings**

Stage 1: We undertook framework analysis according to outcome measures.<sup>17</sup> Numerical data are presented within the narrative. Meta-analysis or other quantitative synthesis was not possible due to the heterogeneity of interventions, populations, and outcomes.

Stage 2: Having categorised barriers and facilitators previously identified to the domains of the TDF, we mapped BCTs that would address these barriers (according to published taxonomies<sup>23,24</sup> and the judgement of a CPsychol (JD)). We mapped intervention components to BCTs and whether not these were implicitly or explicitly used. The result was identification of barriers and facilitators (Raju et al., unpublished data, 2023) addressed and neglected.

### **Results**

In total 21 papers were included. Details relating to study characteristics, quality, and findings are presented below according to our stage 1 framework analysis based on intervention outcome measures: (1) lifestyle knowledge and behaviours, (2) clinical outcomes, (3) mental health and wellbeing, and (4) evaluation/satisfaction.

### **Study Characteristics**

Twenty-one papers were included (table 2). All but one study was conducted in the United States of America (USA). The exception was one in Iran. Ethnic minority groups were African American (n=3), Turkish (n=1), Hispanic (n=3), Latina (n=3), and mixed (n=11). Two papers reported that participants were from low-income groups. Six were RCTs, five cohort, four quasi-experimental, two surveys, two feasibility studies, one pilot RCT, and one secondary analysis. Eleven interventions targeted a broad range of lifestyle factors including diet and exercise but extending to, for example, communication, sleep-hygiene, and assertiveness. Eight focused on diet, exercise, or a combination of both. Two were based on mindfulness. Some interventions were delivered to individuals and others were group based, and some used both strategies. There were a wide range of outcomes measured including weight, nutrition and exercise practice, knowledge, depressive symptoms, and glucose tolerance. Few papers reported the theoretical underpinning of the intervention being tested. Exceptions were the use of behaviour change theory,<sup>25</sup> social learning theory,<sup>26</sup> the

Transtheoretical model,<sup>27</sup> Social Cognitive Theory,<sup>27-29</sup> and the self-efficacy and individual goal setting framework.<sup>30</sup>

**Table 2: Summary of intervention studies included in the review**

First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
Abedi-Aminloui (2019) <sup>31</sup>	Explore intervention impact on knowledge, attitude, practice, and GWG in women in their first pregnancy n=86 (of whom 89% Turkish), Iran	Quasi-experimental study (pre/ post)	Educational intervention comprising lectures and Q&A. Three one-hour sessions per trimester. Delivered by a nutritionist. Content included information on nutrition and self-care.	Improvements in knowledge (p=0.019) and nutrition practice (p<0.001) at post-test intervention compared with the control group. Fewer women in the intervention group gained more weight than recommended (20.9% compared with 30.2%) (p<0.015). No change in attitude.	9/9
Cahill (2018) <sup>25</sup>	Evaluate intervention effectiveness in African American pregnant women. USA (n=267)	RCT	Lifestyle intervention to reduce excessive GWG. Co-developed with Parents and Teachers, tailored to barriers and facilitators to healthy GWG amongst African American women (no reference), and underpinned by behaviour change theory. Ten, fortnightly home visits, delivered by parent educators. Content included GWG goal setting, exercises, portion size, and managing cravings.	Intervention group gained less weight weekly (0.08kg; p=0.04) and overall (1.6kg; p=0.02) than standard care. A smaller percentage of the intervention group had weekly GWG that exceeded IOM guidelines (62.4% vs. 77.4%; P<0.01). There were no significant differences in obstetric or neonatal outcomes.	12/13: Groups were not similar at baseline
Epel (2019) <sup>32</sup>	Investigate intervention effect on perceived stress, depression, exercise, and GWG in overweight/ obese	Quasi-experi-mental study	Mindful Moms Training (MMT), described in detail below. <sup>33</sup>	Greater reductions in perceived stress (p<0.05), depressive symptoms (p<0.01), experiential avoidance (p<0.01), lower levels of impaired glucose tolerance (p<0.05), more leisure-time exercise	9/9

First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
	low income pregnant African American (n=84), Latino (n=64), White (n=29), and Other (n=37) women. USA.			( $p<0.001$ ), and a greater likelihood of gaining weight below the IOM recommendations ( $p<0.05$ ) in the intervention compared with control group.	
Gesell (2015) <sup>26</sup>	Explore intervention feasibility and initial efficacy among pregnant Hispanic (n=69), African American (n=8), White (n=5), and Other (n=4) women in the USA.	Feasibility trial	The Madre Sana, Bebe´ Sano/Healthy Mother intervention to reduce weight gain in pregnancy, based upon Social Learning Theory <sup>34</sup> and a Life Skills Training programme. <sup>35</sup> Women attended weekly 90-minute group sessions for 12 weeks delivered by bilingual healthcare providers. Content involved discussions relating to cultural traditions, decision-making, self-efficacy, and problem-solving to support exercise, nutrition, sleep hygiene, stress management, communication, social skills, assertiveness, money, and time management.	Significantly fewer normal weight women in the intervention group exceeded recommended weight gain ( $p=0.036$ ).	9/11: Groups were not similar at baseline; participants were not analysed in the groups allocated
Hawkins (2015) <sup>27</sup>	To explore intervention feasibility in overweight and obese pregnant Hispanic women. US (n=68)	Pilot RCT	Estudio VIDA, an individually and culturally tailored lifestyle intervention based on previous approaches with general population Hispanic participants. Underpinned by the Transtheoretical Model <sup>36,37</sup> and Social Cognitive Theory. <sup>38</sup> Content included a manual with tips on overcoming barriers, pedometer, physical activity log, and picture-based food guide.	The intervention group showed an increase in vigorous-intensity activity ( $p=0.04$ ) and increase in fibre intake ( $p=0.02$ ) compared with the control group. Most Ps were satisfied with intervention.	12/13: Unclear whether participants blind to assignment

First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
			Delivered by a bicultural, bilingual health educator in 6-monthly counselling sessions and five telephone booster sessions.		
Herring (2016) <sup>28</sup>	To explore intervention impact on GWG amongst overweight or obese African American women. USA (n=66)	Pilot RCT	Technology-based behavioural intervention, underpinned by Social cognitive theory <sup>38</sup> and social ecological model <sup>39</sup> involving a Facebook group, links to websites, tailored text messages to encourage self-monitoring, calls from a qualified health coach, and hard copy information. Diet suggestions were tailored to social norms.	Fewer women exceeded guidelines on GWG in the intervention compared with control group (p=0.033).	12/13: Participants not blind to treatment assignment
Kieffer (2013) <sup>40</sup>	To explore intervention effectiveness in reducing depressive symptoms in pregnant and early postpartum Latinas. USA (n=275)	RCT	Healthy Mothers on the Move (MOMs), informed by a community-based participatory approach. <sup>41</sup> Materials included "The Little Pregnancy Book" (foetal and new-born development and care, advice on food), monthly newsletters, and attendance reminder cards. Culturally tailored, delivered in Spanish by trained Latina community health workers across 11-weeks. Involving 2 home visits and 9 group meetings and activities to develop knowledge, skills, and address barriers.	Reduction in mean depression score from baseline to follow-up (p=0.042), particularly for non-English speaking participants (p=0.041) in intervention compared with control group.	10/12: Groups not similar at baseline, participants not blind to treatment assignment
Kieffer (2014) <sup>42</sup>	To evaluate intervention effectiveness on dietary behaviours on overweight	RCT	Healthy Mothers on the Move (MOMs) described above. <sup>40</sup> Food frequency questionnaire <sup>43</sup> also used to assess dietary intake.	Intervention group consumed less added sugar (p=0.05), total fat (p<0.05), saturated fat (p<0.01), reduced their percentage of daily calories	11/12: Participants were not blind to treatment assignment



First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
	pregnant Latina women. USA			from saturated fat ( $p<0.001$ ), and increased vegetable ( $p<0.001$ ) and fibre consumption ( $p<0.05$ ) compared with the control group.	
Koleilat (2017) <sup>44</sup>	To develop, implement and examine intervention effects on GWG among Hispanic (n=152), multi-racial (n=16), African American (n=15) White (n=10), Asian (n=9), Other (n=6), and Pacific Islander (n=4) women. USA	Prospective cohort study	Appointment with Women, Infants and Children (WIC) staff (trained by researchers) each trimester where they received support in weight monitoring and guidance, exercise tracker and leaflet with diet and exercise information and GWG risks.	No statistically significant differences.	11/11
Kominiarek (2018) <sup>45</sup>	Compare GWG in women receiving traditional and group prenatal care in Hispanic (n=627), Black (n=68), White (n=77), and Other/unknown (n=36). USA	Retrospective cohort study	Described in detail below. <sup>46</sup>	There were no significant differences in excessive GWG between women receiving traditional and group prenatal care in adjusted analyses.	10/10
Kominiarek (2018) <sup>47</sup>	Assess intervention	Quasi-experi-mental	Women were given Fitbit Flex (pedometer) and instructions, a 10-	Mean sedentary hours increased as gestational age	7/8: Unclear whether

First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
	feasibility in pregnant Hispanic (n=36), Black/ African American (n=6), Asian (n=2), and Other (n=1) pregnant women. USA		minute group-based counselling (no details of counsellor) on GWG, step count goals, guidance on safe exercises during pregnancy (in English or Spanish), and were part of an online community. Researchers contacted women if activity had not been synced >three days.	increased ( $p<0.001$ ) and 57% (n=18) agreed being in the study helped them to achieve their weight gain goals.	participants were already using an activity tracking device
Liu (2015) <sup>29</sup>	To assess intervention feasibility with overweight and obese African American women (n=54). USA	Pilot RCT	Informed by social cognitive theory <sup>38</sup> and previous research. <sup>48</sup> Delivered by a dietician and African American team member. Included recommendations for healthy GWG, diet, exercise, meal preparation, problem solving, goal setting, weight gain chart, scales, diet logs, individual counselling (up to 4 sessions), 8 group sessions, telephone support, and a home visit.	The intervention group showed a significant increase in steps per day ( $p=0.06$ ) and moderate-vigorous PA ( $p=0.04$ ) from baseline to post-partum. The mean birth length of babies born to women in the intervention group was significantly longer ( $p=0.0006$ ). Several aspects of the intervention were rated as helpful, including nutrition and PA information.	9/10: Strategy to deal with confounders not reported
Mackert (2016) <sup>49</sup>	Investigate intervention effect on Hispanic (n=56), African American (n=9), Other or Multi-racial (n=12) and White (n=5) women, 28 of whom were pregnant, 34 had at least one child,	Cross-sectional survey	Illustrated brochure provided in a health clinic, including information in relation to GWG and breastfeeding.	No significant difference in intentions or attitudes re GWG.	6/7: Unclear whether survey was valid and reliable

First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
	and 21 nulliparous. USA				
Militzer (2020) <sup>50</sup>	Explore the effectiveness of a behavioural intervention in Latina women during pregnancy and early post-partum. USA (n=251)	Secondary analysis of data	Healthy mothers on the move - see above. <sup>40</sup>	The intervention group showed smaller declines in exercise during pregnancy than the control group (p<0.001).	6/6
Rosenbloom (2012) <sup>51</sup>	Examine intervention effect on GWG in African American (n=94), Hispanic (n=56), and White/Other women (n=16). USA	Prospective cohort	Intervention included diet and exercise advice, educational pamphlet, weight gain guidelines, feedback, counselling, pamphlet with weight gain guidelines, and feedback and counselling by a registered nurse or patient care technician.	Intervention group participants were less likely to gain excessive weight (p=0.009) (after controlling for covariates).	9/11: Groups were not similar at baseline and strategies to address incomplete follow up were not used
Tanner-Smith (2014) <sup>52</sup>	Explore the differences in GWG amongst women receiving and not receiving a pre-natal intervention in African American (n=299), Latina (n=51, and White (n=43) women. South USA.	Retrospective cohort based upon a multi-site evaluation of CenteringPregnancy <sup>53</sup>	CenteringPregnancy. <sup>54</sup> Women met for ten 90-minute sessions in groups of 8 to 12. Women took an active role in their prenatal risk assessment (e.g. weight, blood pressure) before an education component involving videos, handouts and worksheets (in Spanish) followed by sharing of concerns. Women were encouraged to bring partners, friends or family. Groups were led by a certified nurse or midwife.	Fewer participants with excessive GWG (p<0.05) in the intervention compared with care as usual group.	10/10

First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
Tesdahl (2015) <sup>55</sup>	Explore intervention impact on GWG. No ethnic information offered but mainly non-White based upon original study. Nashville, USA (n=59)	Cross-sectional surveys (conducted at weeks 6 and 12)	Madre Sana, Bebé Sano/Healthy Mother, Healthy Baby intervention, described above. <sup>26</sup>	69% (n=41) formed at least one network tie, and only 4% of these ties were maintained. There was no association between tie formation and GWG.	7/8 - Insufficient demographic details of those included in analysis
Trak-Fellermeier (2019) <sup>30</sup>	Evaluate intervention effect on GWG and offspring birth weight in overweight/obese pregnant Hispanic women. Puerto Rico, USA (n=31)	RCT	Pregnancy and EARly Lifestyle Improvement Study (PEARLS) <sup>56</sup> based on a self-efficacy and individual goal-setting framework <sup>57</sup> and involving two visits from interventionist followed by 2-hour fortnightly group sessions and monthly telephone calls to assess progress. Other materials included pedometer, weight monitoring chart, and resource guide.	No significant difference	10/12: Treatment groups not similar at baseline and participant blinding unclear
Trudnak (2013) <sup>46</sup>	Compare maternal and birth outcomes in Hispanic Latina Spanish-speaking women receiving group-based and individual prenatal care. USA (n=487)	Retrospective cohort	CenteringPregnancy <sup>54</sup> described above. <sup>52</sup>	More incidents of vaginal birth, (p=0.02), pre-natal and (p<0.01) and post-natal care attendance (p<0.01) in the group compared with individual care intervention.	9/10 Demographic differences between groups
Vieten (2018) <sup>33</sup>	Explore intervention feasibility and effect on stress,	Quasi-experi-mental	Mindful Moms Training (MMT) based upon the Obesity-Related Behavioural Intervention Trials (ORBIT) model of intervention development <sup>58</sup> and	All were "very satisfied" or "satisfied", 93% found mindful eating "very useful" or useful. There were post compared	7/7

First author (year)	Aim and participants	Methods	Intervention description	Intervention impact	Quality appraisal
	depression and eating behaviours in overweight, low-income African American (n=39), Latino (n=35), Other (n=21), and White (n=14) pregnant women. California, USA		informed by service user focus groups <sup>59,60</sup> . Eight weekly two-hour group sessions including mindful movement and eating, diet and stress reduction delivered by Masters-level psychology student, midwife, and nurse practitioner. Materials were cards summarising the intervention stages and completed reflective homework exercises.	with pre reported increases in mindful eating (p=0.01).	
Williams (2019) <sup>61</sup>	Investigate intervention feasibility of an intervention on GWG and infant weight in Hispanic women. USA (n=23)	Feasibility study	Promote healthy gestation and infant weight by weekly sessions during pregnancy/2-6 months post-partum delivered by a community health worker. A culturally adapted (no details) curriculum of exercise classes, nutrition, goal setting, text message support, and a Facebook group.	70% of women were within 5 pounds of their pre-pregnancy weight or below this at 5 months post-partum.	6/6

**Table 3: Summary of interventions according to the TIDieR checklist**

Paper	Rationale stated?	Materials described?	Procedure described?	Expertise/ background of person delivering? (planned)	Mode of delivery reported? (planned)	Location? (Planned)	When and how much? (planned)	Tailoring? (planned)	Modifications?	Intervention fidelity? (planned)	Intervention fidelity? (assessed)
Abedi-Aminloui (2019) <sup>31</sup>	✓	✓	✓		✓	✓	✓	✓			
Cahill (2018) <sup>25</sup>	✓	✓	✓		✓	✓	✓	✓		✓	
Epel (2019) <sup>32 2</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Gesell (2015) <sup>26 3</sup>	✓		✓		✓	✓	✓	✓		✓	✓
Hawkins (2015) <sup>27</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Herring (2016) <sup>28</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Kieffer (2013) <sup>40 1</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Kieffer (2014) <sup>42 1</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Koleilat (2017) <sup>44</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Kominiarek (2018) <sup>45 4</sup>	✓	✓	✓	✓	✓	✓	✓	✓			✓
Kominiarek (2018) <sup>47</sup>	✓	✓	✓		✓	✓	✓	✓		✓	✓
Liu (2015) <sup>29</sup>	✓	✓	✓	✓	✓		✓	✓		✓	✓
Mackert (2016) <sup>49</sup>	✓	✓	✓		✓	✓	✓	✓		✓	
Miltzer (2020) <sup>50 1</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Rosenbloom (2012) <sup>51</sup>	✓	✓	✓	✓	✓	✓		✓			
Tanner-Smith (2014) <sup>52 4</sup>	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓

Paper	Rationale stated?	Materials described?	Procedure described?	Expertise/ background of person delivering? (planned)	Mode of delivery reported? (planned)	Location? (Planned)	When and how much? (planned)	Tailoring? (planned)	Modifications?	Intervention fidelity? (planned)	Intervention fidelity? (assessed)
Tesdahl (2015) <sup>55 3</sup>	✓		✓		✓	✓	✓	✓		✓	✓
Trak-Fellermeier (2019) <sup>30</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Trudnak (2013) <sup>46 4</sup>	✓	✓	✓	✓	✓	✓	✓	✓			✓
Vieten (2018) <sup>33 2</sup>	✓	✓	✓	✓	✓	✓	✓	✓			✓
Williams (2019) <sup>61</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

## Methodological quality

The methodological quality of intervention studies was generally robust, although groups were not similar at baseline in several studies. Quality of intervention reporting was assessed according to the TIDieR checklist<sup>22</sup> (table 3). Where the same intervention was reported, this is noted in bold superscript numbers. Although intervention methods and procedure were described to some extent in nearly all papers, this was sometimes brief and lacking in sufficient detail to allow replication. Few papers reported any intervention modifications.

## Stage 1: Findings

Intervention effects were grouped into the following categories: (1) lifestyle knowledge and behaviours, (2) clinical outcomes, (3) mental health and wellbeing, and (4) evaluation/satisfaction. A narrative summary of these is presented below.

### *Lifestyle knowledge and behaviours*

This category comprised impact relating to knowledge and behaviours associated with nutrition and exercise. Only one study noted any significant increase in knowledge relating to nutrition ( $p=0.019$ ).<sup>31</sup> There was evidence of significant changes in dietary practice generally ( $p<0.001$ ),<sup>31</sup> and reduced sugar ( $p=0.05$ ), fat ( $p<0.05$ ), and increased vegetable ( $p<0.001$ ) and fibre consumption ( $p<0.05$ ),<sup>42</sup> ( $p=0.02$ ).<sup>27</sup> Increased exercise or activity was reported in some studies ( $(p<0.001)$ ,<sup>32</sup> ( $p=0.04$ ),<sup>27</sup> ( $p=0.04$ )),<sup>29</sup> an increase in steps in one ( $p=0.06$ )<sup>29</sup> and a smaller decline in exercise in another ( $p<0.001$ ).<sup>50</sup> These interventions with significant outcomes on lifestyle knowledge and behaviours included the following content: information on nutrition,<sup>27,31,42,50</sup> reminder cards,<sup>42,50</sup> self-monitoring,<sup>27,42,50</sup> pedometer,<sup>27</sup> and counselling.<sup>27</sup> All interventions included multiple contacts throughout pregnancy.

### *Clinical outcomes*

Although several papers captured weight as an outcome measure, this was at various stages of pregnancy and in different categories of women (e.g. normal, overweight, and obese). Significant findings of those exposed to the intervention included; fewer women gained excessive weight ( $p<0.015$ ),<sup>31</sup> ( $p=0.02$ ),<sup>25</sup> ( $p=0.009$ ),<sup>51</sup> ( $p<0.05$ ),<sup>52</sup> less weight was gained overall ( $p<0.05$ ),<sup>32</sup> ( $p=0.033$ ),<sup>28</sup> and fewer normal weight women exceeded recommended weight gain ( $p=0.036$ ).<sup>26</sup> Intervention content included information on nutrition, weight gain and self-care,<sup>25,26,28,31,51,52</sup> mindful eating and movement,<sup>32</sup> managing cravings,<sup>25</sup> goal setting,<sup>25</sup> prompts,<sup>28</sup> and feedback.<sup>51</sup> Several included one-to-one, group and focused support including counselling,<sup>51</sup> group support,<sup>28,32,52</sup> and in single cases including partners and friends,<sup>52</sup> delivery by parent educators,<sup>25</sup> and embracing cultural



traditions and promoting self-efficacy and problem solving.<sup>26</sup> One study involving a lifestyle intervention (information, goal setting, problem solving, monitoring, counselling, and group support) identified the mean birth length of babies was longer in the intervention compared with control group ( $p=0.0006$ ).<sup>29</sup>

#### *Mental health and wellbeing*

Two studies measured outcomes relating to mental health and wellbeing. There were greater reductions in perceived stress ( $p<0.05$ ) and depressive symptoms ( $p<0.01$ ) in the intervention group of one study<sup>32</sup> and a reduction in mean depression score from baseline to follow-up ( $p=0.042$ ), (particularly for non-English speaking participants  $p=0.041$ ) in the second.<sup>40</sup> Intervention content included mindful movement and eating, stress reduction,<sup>32</sup> information and reminders,<sup>40</sup> and group support.<sup>32,40</sup>

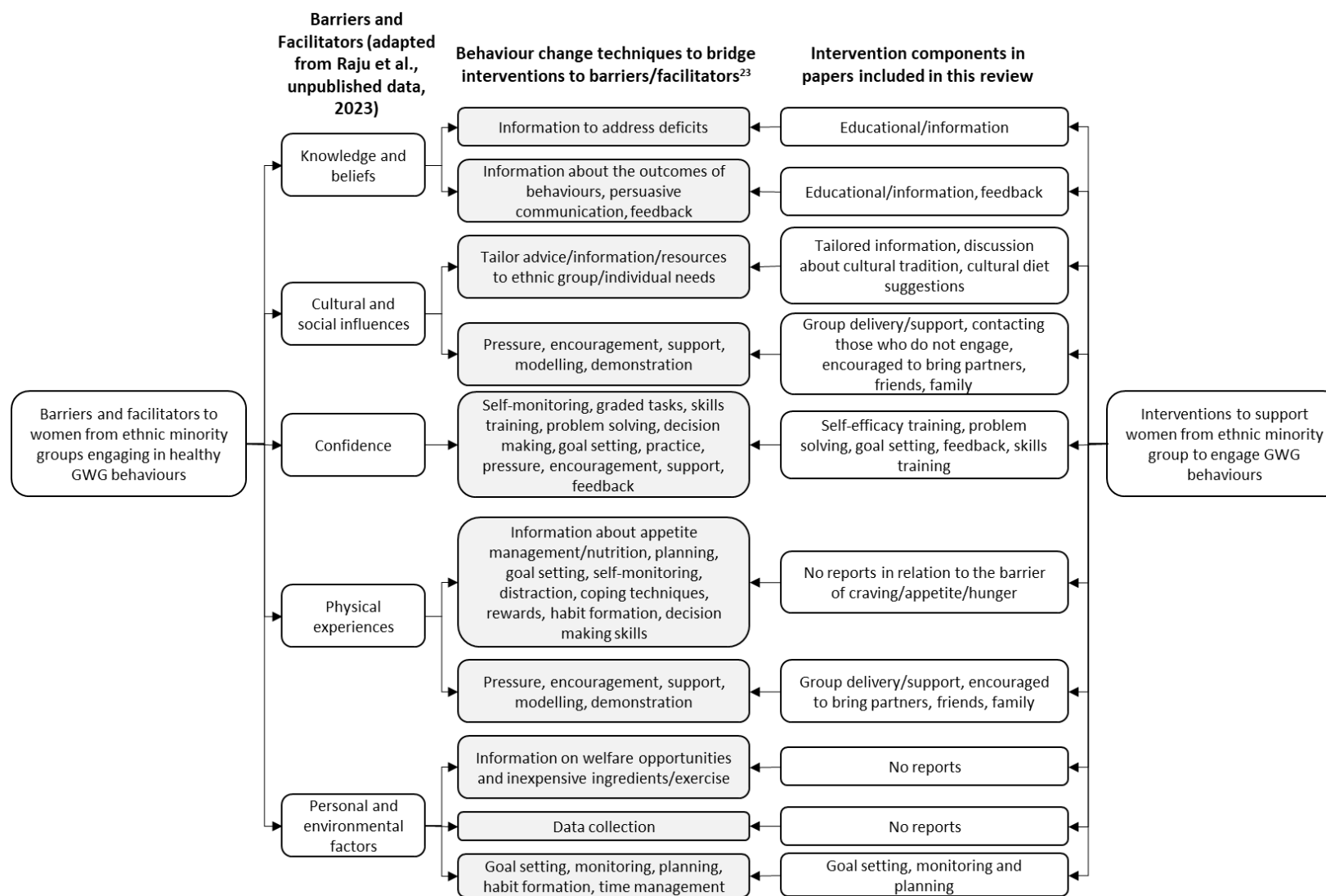
#### *Evaluation/satisfaction*

Only three studies considered participants' views and experiences of the interventions. In one, 57% of participants considered being part of the intervention helped them achieve their weight gain goals.<sup>47</sup> In the second all participants were "very satisfied" or "satisfied", and 93% found mindful eating "very useful" or "useful".<sup>33</sup> In the third, several aspects of the intervention were considered "helpful".<sup>29</sup> Intervention content included use of a pedometer with goals for step count, group-based counselling,<sup>29,47</sup> information about safe exercise, inclusion in an online community,<sup>47</sup> and mindful movement and eating and stress reduction,<sup>33</sup> goal setting, problem solving, monitoring, and group support.<sup>29</sup>

#### **Data mapping**

Figure 2 illustrates the process described in the section relating to analysis with a summary of results. This followed by narrative describing interventions according to previously identified barriers and facilitators.

**Figure 2. The extent to which published interventions theoretically address known barriers and promote facilitators**



## Stage 2: Findings

The five themes representing previously identified barriers and facilitators are listed below. Within each of these themes we illustrate examples of how the barriers and facilitators have been addressed in included intervention studies. Figure 2 demonstrates barriers and facilitators addressed and neglected.

### *Theme 1: Knowledge and beliefs*

The majority of interventions included components relating to information about diet, exercise and weight.<sup>25-31,40,42,44-47,49-52,55,61</sup> When reported, these were delivered by a nutritionist or dietitian,<sup>29,31</sup> parent educators,<sup>25</sup> health care providers,<sup>26,55</sup> a health educator,<sup>27</sup> a health coach,<sup>28</sup> community health workers,<sup>40,42,50,61</sup> a registered nurse or midwife,<sup>51,52</sup> a patient care technician,<sup>51</sup> “staff”,<sup>44</sup> or an “interventionist”.<sup>30</sup> Mode of delivery included lectures, discussion and question and answer sessions,<sup>26,30,31,40,42,46,50,52,55</sup> home visits,<sup>25,29,40,42,50</sup> counselling sessions,<sup>27,29,47</sup> telephone calls,<sup>27-30</sup> written information,<sup>27,30,46,49,51,52</sup> websites, technology or text message,<sup>28,30,45,47,52,61</sup> and other unspecified face-to-face delivery.<sup>61</sup> Content included information about nutrition and/or weight,<sup>25-29,31,40,42,49-51,55,61</sup> exercise,<sup>25,26,29,44,45,47,51,61</sup> and lifestyle more generally.<sup>26,31</sup>

### *Theme 2: Cultural and social influences*

Nearly half of reported interventions were tailored according to ethnic needs.<sup>25-27,40,42,50,55,61</sup> Some were developed or delivered by the target group. These included parents and teachers,<sup>25</sup> a community based participatory approach,<sup>40,42,50</sup> and delivery by peers (parent educators).<sup>25</sup> A number were delivered by bilingual and or bicultural healthcare providers<sup>26,27,55</sup> or delivered in the participants’ native language.<sup>40,42,50</sup> Two studies (reporting the same intervention) included discussion about cultural tradition.<sup>26,55</sup> Two interventions offered diet suggestions tailored to cultural norms<sup>28,61</sup> and on one occasion the intervention was tailored at an individual level.<sup>27</sup> With regard to social influences, many interventions were delivered to groups<sup>26,28-30,32,33,40,42,45-47,50,52,55,61</sup> with some specifying the purpose as peer support.<sup>26,28,45,47,61</sup> Two interventions encouraged women to bring partners, friends or family.<sup>46,52</sup>

### *Theme 3: Confidence*

Intervention components reported that would theoretically address confidence included goal setting,<sup>25,29,30</sup> problem solving,<sup>26</sup> content relating to self-efficacy,<sup>26,30,55</sup> counselling,<sup>27,51</sup> skills training,<sup>40,42</sup> feedback,<sup>51</sup> and stress reduction.<sup>32,33</sup>

#### *Theme 4: Physical experiences*

Physical experiences identified included cravings, changes in taste or appetite, fatigue, uncomfortable foetal movement, hunger, nausea, and heartburn. No study explicitly sought to address these barriers. However, theoretically it may be that some nutritional advice given (see theme 1) may have been effective if adopted. To operationalise this advice two further reported intervention components may have been effective. These were goal setting<sup>25,30</sup> and monitoring.<sup>27,29,30,44-47,52</sup>

#### *Theme 5: Personal and environmental factors*

There were no reported intervention components specifically addressing financial concerns about the cost of healthy food and exercise facilities, the availability of healthy compared with fast food, or living in an unsafe neighbourhood. Money and time management were addressed in two interventions.<sup>26,29,55</sup> Other intervention components that may have been helpful to address these issues included goal setting,<sup>25,30</sup> problem solving, and counselling.<sup>27,29,51</sup>

### **Discussion**

This systematic review with narrative synthesis identified interventions to support healthy GWG in ethnic minority groups. Using the TDF and BCTs, we mapped previously identified barriers and facilitators with interventions identified in this review to establish those addressed and neglected. A total of 21 papers were included. Methodological quality was generally robust, although the quality of reporting according to TIDieR was generally insufficient to allow replication. All but one study was conducted in the USA.

Interventions predominantly provided information on diet, exercise, and weight and nearly half were culturally tailored. Intervention effectiveness was measured in terms of knowledge about lifestyle and health behaviours, clinical outcome (in most cases weight), mental health and wellbeing, and participant evaluation or satisfaction. A small number of studies reported significant changes in knowledge, dietary practices, exercise, weight, improved stress, and depression and, in one study, increased baby length. Intervention participants were generally satisfied and found them useful. When mapping interventions to reported barriers and facilitators, little attention was paid to addressing three of the five themes: confidence, physical experiences, and personal and environmental factors.

We know that obesity during pregnancy comes with significant risks.<sup>5,6</sup> When seeking to change behaviour in health care settings, information and advice is typically offered<sup>62</sup> and this was largely the case with most of our included intervention papers. However, it is well

established that theoretically compared with non-theoretically underpinned interventions are more effective in influencing health behaviours.<sup>63,64</sup> Despite reference to various theoretical approaches few papers detailed how these were used to underpin interventions using phrases such as “informed by” or “based on”.

Despite a comprehensive search and robust methodology this review has limitations. The reporting of interventions was limited and therefore we cannot guarantee that we have captured all intervention components. Equally, because we have mapped to identified barriers and facilitators and papers did not report the rationale for interventions (generally or intervention components specifically), it is possible that an unreported rationale may exist.

## **Conclusions**

Whilst some studies claimed to “tailor” their interventions this was in relation to assumed cultural norms rather than a nuanced understanding of the particular group. That is, interventions *were not* tailored to identified barriers. The mismatch between barriers and facilitators identified in previous literature and interventions reported here may explain why, in our review, despite measurable improvements in knowledge, there were few changes in GWG behaviours and clinical outcomes.

The risks to mother and baby associated with excessive GWG, particularly in ethnic minority groups, are well documented. Despite the literature relating to barriers and facilitators to healthy GWG and a range of culturally sensitive interventions, there is little link between these two bodies of evidence. We therefore suggest that future design and testing of interventions explicitly and comprehensively seeks to address barriers and promote facilitators specific to the ethnic minority groups in question.

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### **3.6 Summary and overview of research objectives**

The literature reviews began with an exploration of the experiences of midwives and pregnant women, since an understanding of these was integral in informing the evidence that would be combined with the interview and co-design workshop findings. These first two reviews highlighted several challenges to supporting or managing weight during pregnancy amongst midwives and pregnant women alike. For midwives, these included the reported sensitivity of weight, their own body image and a perceived lack of time and resources. Women's barriers within interventions included unclear guidance and personal challenges such as pregnancy-related symptoms and concerns about weight monitoring. Additionally, facilitators were reported by both groups. For instance, midwives reported personal strategies for advising and supporting women, whilst many pregnant women were motivated to protect the health of their baby and encouraged by feelings of enjoyment from the PA within interventions.

The decision to focus on South Asian women was made whilst the first two reviews were being conducted. Thus, a more nuanced understanding of the cultural context of South Asian women was needed. An initial scoping search of studies on the experiences of South Asian pregnant women of GWG revealed a paucity of research exploring this. Therefore, the following were explored in one review: i) the barriers and facilitators to healthy GWG and ii) the extent to which interventions are tailored and address the barriers and promote the facilitators for weight management during pregnancy. These were later divided into two reviews for practicality when preparing the manuscripts. The first review revealed some

barriers that were similar to those who engaged with interventions in the former review. These included the physical changes of pregnancy and personal and environmental factors. However, women from ethnic minority backgrounds reported specific challenges related to cultural and social influences, which included preferences for a larger body size. Nevertheless, some factors such as the health of the baby and living in a safe environment served as facilitators of healthy lifestyle behaviours. The final review of the extent to which interventions addressed the barriers and promoted these facilitators indicated that the majority of interventions focused on the provision of information. However, there was less emphasis on addressing women's confidence, physical experiences, personal and environmental factors and physiological barriers.

The reviews have highlighted that midwives and pregnant women encounter social, cultural, and organisational barriers in acting upon their knowledge of the risks of excessive GWG. For midwives, these include competing responsibilities and concerns with causing offence, which served as challenges when supporting women with weight management. Pregnant women reported a lack of family support, cultural practices, and work and family commitments. In addition, very few studies explored or addressed the needs of women from South Asian backgrounds. Since midwives are a woman's first and most frequent source of formal contact during pregnancy, it is important to ensure that their understandings are initially addressed. This will ensure that they feel more prepared to have culturally sensitive consultations about weight with pregnant South Asian women.

The aim of this study is to co-design prototype strategies to enhance midwives' GWG mindlines in relation to South Asian women in Birmingham. This study offers a unique contribution to knowledge through an original application of mindlines theory to improve midwives' consultations with pregnant South Asian women regarding GWG. The objectives are as follows:

1. Qualitative interviews: Explore how lay and professional gestational weight gain mindlines developed during *socialisation* and currently interact with each other. I will help to *externalise* knowledge by asking for specific examples and stories. These findings will be *combined* with research evidence from the literature reviews.
2. Co-design: Co-design prototype strategies that will help midwives to have culturally sensitive consultations about weight with South Asian pregnant women. These should *combine* the *externalised* practical understanding of these groups with research evidence and guidelines.

3. Prototype feasibility testing: To develop and test the prototypes of strategies to ensure that the combined knowledge is transformed and can be *internalised* and used by midwives in Birmingham.

## **Chapter 4 Theoretical foundation and research methodology**

### **4.1 Introduction**

As specified previously, the aim of this study is to enhance midwives' GWG mindlines in relation to South Asian women in Birmingham. This chapter will begin with an explanation of evidence-based practice (EBP) and justification of its importance. This will be followed by an overview of Knowledge Mobilisation (KMb) and its relevance in supporting EBP.

Subsequently, a description of mindlines will be provided, alongside a summary of why the enhancement of these is a relevant approach to facilitating EBP in relation to GWG. Finally, an outline of exploratory qualitative methodology and Experience-based co-design (EBCD) will be provided.

### **4.2 Evidence-Based Practice**

The importance of evidence-based healthcare should not be overlooked. EBP has been defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett et al., 1996: 71). This requires an integration of relevant research with clinical expertise and patient values and preferences (Straus et al., 2018). EBP has evolved considerably since Sackett began guiding physicians on how to appraise the medical literature in 1981 (Sackett, 1981). For instance, the Levels of Evidence (LOE) rating system was developed to guide practitioners in evaluating scientific evidence and placed randomised controlled trials at the top of the hierarchy of evidence. (Guyatt, 1991). This was then developed by Sackett to consider the risk of error (Sackett, 1989) and later elaborated with criteria for upgrading or downgrading research evidence (Oxford Centre for Evidence-based Medicine, 2009). Despite the broad remit of EBP, there have been critiques regarding the lack of emphasis on clinical experience and patient needs and preferences (Greenhalgh et al., 2014; McCartney et al., 2016). There have also been concerns that EBP prioritises certain forms of evidence over others and therefore risks marginalising the voices of unheard groups (Khoury, 2019).

EBP is a central component in the delivery of high-quality healthcare, including midwifery practice. For instance, the standards of proficiency for midwives define evidence-based care as "decision-making that integrates midwifery expertise with knowledge derived from the best available evidence." (Nursing & Midwifery Council, 2019: 54). Evidence-based approaches also underpin a range of skills within these standards, including communication

and relationship-building with women (Nursing & Midwifery Council, 2019). As discussed in chapter 1, there is a wealth of evidence for the risks of excessive GWG to the mother and baby. However, it is important for midwives to integrate their clinical knowledge and experience with this research evidence in order to effectively advise and support women with their weight management.

National guidance for local maternity services advocates engagement in preventative programmes to understand local needs, and to address these through an asset-based approach (NHS England and NHS Improvement, 2021). An asset-based approach identifies the strengths of individuals such as local knowledge, networks and skills, subsequently empowering them to formulate solutions (Local Government Association, 2021). This emphasises the importance of experiential knowledge in helping to address the “know-do” gap. Despite this, there remain challenges in implementing EBP. Evidence often fails to reach practice due to wider contextual factors such as lack of perceived relevance to the clinical context (Pitsillidou et al., 2021) and insufficient time amongst practitioners to consult the literature (Paci et al., 2021). This is concerning, and highlights disparities between research findings, policy recommendations, and professional and patient knowledge of what will work in practice. However, KMb provides a potential solution to the knowledge-practice gap surrounding GWG. The following section provides a discussion of this.

### **4.3 Knowledge Mobilisation**

KMb aims to minimise the gap between evidence and practice. It can be understood as an “umbrella term encompassing a wide range of activities relating to the production and use of research results, including knowledge synthesis, dissemination, transfer, exchange, and co-creation or co-production by researchers and knowledge users.” (Social Sciences and Humanities Research Council, 2019). In essence, KMb involves bringing “different communities together to share knowledge to catalyse change” (Wye et al., 2021). Of further importance is the need to consider which forms of knowledge align with particular contexts, and how they can be amplified (Moss, 2013). Thus the process of knowledge exchange is fluid, dynamic, and social rather than linear and one-directional (Canadian Institutes of Health Research, 2016; Ward et al., 2012).

KMb originates from Knowledge Management (KM) initiatives in business in the 1990s, which emphasised the need to pass on knowledge that is explicit (within research, written reports, and guidelines) and tacit (built from individual experience, insights, and memories) (Nonaka and Takeuchi, 1995). It subsequently migrated to Canadian health and social care

in the early 2000s (Lavis et al., 2003; Lomas, 2007) and later to the UK in response to the limited uptake of research findings and an acknowledgment that existing linear, rational, instrumental approaches do not work (Nutley et al., 2007). Despite multiple approaches, a gap between theory and practice exists (Davies et al., 2015), although this is steadily being addressed. The breadth of methods within KMb are succinctly summarised by the archetypes described by Davies et al. (2015). Table 4.1 below provides a brief description of each of these.

**Table 4.1: Description of archetypes A-H**

Archetype	Description
A – Producing knowledge	Production and dissemination Examples – systematic reviews, web portals
B – Brokering and intermediation of own research to policy	Different types of knowledge are exchanged and transformed. Activities include dissemination, interaction and training, and education.
C – Brokering and intermediation of wider research to policy	
D – Advocating for the use of evidence	There is greater emphasis on the context in which knowledge is produced through the use of activities such as social influence and incentives.
E – Helping to move research into practice	This often addresses explicit knowledge but may include local knowledge and other forms of knowledge.
F – Research in practice through local learning and co-design	A variety of stakeholders (including the public) are influencing a range of outcomes.
G – Developing networks around research evidence	Knowledge and expertise are shared within networks. Research-based knowledge is combined with prior knowledge and local understanding to support practice.
H – Advancing knowledge mobilisation	Progressing the theoretical basis of knowledge mobilisation – what we know about knowing.

The use of KMb in healthcare has advanced considerably over the last two decades. For instance, the National Institute for Health and Care Research's (NIHR) utilisation of multi-disciplinary partnerships to connect researchers with other stakeholders (including practitioners and patients) in 2008 aimed to enhance the translation of research into practice (Kislov et al., 2018). This was followed by a breadth of other techniques, including evidence synthesis (Tetzlaff et al., 2009) and creative co-design (Grindell et al., 2022). Another approach to KMb in healthcare involves the amendment or enhancement of “mindlines”. This is described in further detail below.



## 4.4 Mindlines

As noted in chapter 1, mindlines are “collectively reinforced, internalised tacit guidelines” (Gabbay and le May, 2004: 3). Mindlines can be considered as the in-built, daily guidelines that influence our actions and decision-making. They undergo extensive refinement and modification through social processes (Beckett et al., 2018). In other words, the social context inevitably shapes their evolution. Mindlines represent knowledge that has been transformed in order to align with a particular context. Here, diverse evidence is blended across different points in time and place. For example, an individual’s decision to exercise more regularly may be influenced by a mixture of media messages, family norms and prior experience. Mindlines also embody deeper levels of knowing due to the highly specific, contextual nature in which identity and the views of others are integrated. Despite being difficult to articulate, mindlines are able to contend with the complexity of clinical practice and behaviour.

Furthermore, mindlines have a boundedness that enables personally significant conclusions to be formed. For example, the role of previous experiences and personal beliefs are adeptly blended within mindlines. Conversely, guidelines decontextualise the “multiple roles and goals” (Gabbay and le May, 2010: 60) that inevitably frame our decision-making. Mindlines therefore represent more actionable forms of knowing that can drive behaviour and clinical practice. They accomplish this by rapidly transforming knowledge from different points in time and place in order to derive personally relevant meanings. As a result, mindlines concurrently perpetuate and are reinforced by our sense of identity.

Mindlines can maintain both positive and unhelpful practice. Examples of the former include their fusion of clinical experience and training to support dental practice (Hurst, 2023), nursing in end-of-life care (Brattgjerd, 2023) and physiotherapy (van Wijchen and Alme, 2023). However, the content of our mindlines can be difficult to recall, which can hinder observational learning and the recognition of EBP amongst GP trainees (Welink et al., 2020). Furthermore, it has been demonstrated that eczema mindlines are vulnerable to societal myths and organisational norms that under-prioritise the condition (Cowdell et al., 2020). Consequently, the social and organisational context are highly influential in the development of mindlines. There is also evidence that emotions can shape the evolution of mindlines. For instance, feelings of sadness for patients helped to direct the attention of palliative care nurses and their decision-making during case reviews (Hodgins et al., 2022).

However, it is possible for an individual's mindlines to be enhanced to ensure that their actions are productive and align with EBP. Here, the sharing of experiences has the potential to re-organise the connections between pertinent forms of knowledge, and subsequently enhance mindlines. For example, a qualitative study revealed that surgeons' mindlines shifted from an emphasis on repairing anatomy towards patient experience following reports of the harms resulting from transvaginal mesh (Ducey et al., 2020). More recently, information sharing and observational data helped to enhance mindlines during the COVID-19 pandemic, which led to obesity being included as a risk factor for COVID-19 (Suh and Wyer, 2022). As such, mindlines can be enhanced to ensure that they suit the immediate context.

The mindlines model provides a valuable foundation for understanding how midwives can be supported to advise South Asian women about GWG. Indeed, it highlights the social and cultural context in which knowledge surrounding pregnancy-related weight gain is shared. For instance, contradictory messages within social media surrounding healthy eating during pregnancy, and a lack of clear national medical guidelines for healthy weight gain (All-Party Parliamentary Group on a Fit and Healthy Childhood, 2017) allude to a creation of socially misinformed mindlines or those that lack clarity. This was apparent in some of the mindlines of midwives in the first review (Raju et al., 2023a), who voiced uncertainty regarding the provision of advice about weight gain. This indicates a need to address concerns regarding midwives' social context.

The mindlines model presents a relational approach to mobilising knowledge, where evidence is socially transformed and fused with prominent understandings in our mindlines. This suggests that information needs to be exposed to collective sensemaking and the social environment before it can be integrated into midwives' mindlines and influence their practice. Thus, instead of a linear, direct, influence on decision-making, knowledge moves into practice through personal hierarchies of evidence. This corresponds with the influence of Communities of Practice (CoPs) on decision-making within the KMb literature. For example, a study of Haymarket CoPs demonstrated that personal experiences and professional expertise were valued as credible, relevant, and easier to integrate within thinking than research findings (Gabbay et al., 2003). Furthermore, recent evidence suggests that CoPs can provide a context for integrating research evidence with other evidence from the local setting, including clinical expertise and geographical variation (Swaithes et al., 2023). This mirrors the manner in which diverse evidence is melded within mindlines.

Several studies have explored the social construction of collective clinical mindlines (Cowdell, 2023; Cowdell et al., 2020; Gabbay and le May, 2011; Tooman, 2023). For instance, Gabbay and le May (2011) reported that collective sensemaking of chronic kidney disease was influenced by local knowledge of the context, which shaped the definition of this and the individual management of patients. A study on eczema mindlines highlighted the need to acknowledge social influences on lay and practitioner eczema mindlines (Cowdell et al., 2020). These were effectively addressed through a range of strategies in the community, including story reading in primary schools and interactive sessions at the workplaces of healthcare professionals (Cowdell, 2023). Furthermore, a case study of a sepsis-focused knowledge network revealed that interactions enabled mindlines to be shared, which were then exemplified in guidelines and contributed to a reduction in deaths (Tooman, 2023). However, as yet, there is no research related to social and cultural mindlines in relation to GWG. Crucially, the social and cultural context should be considered within strategies to ensure that they provide a tailored approach to enhancing midwives' mindlines in relation to GWG.

Importantly, our mindlines are constantly refined alongside the evolution of a) our own knowledge structures (which incorporate values, beliefs, and experiences) and b) scientific developments (Gabbay and le May, 2011). This indicates a convergence of knowledge across multiple points in time and space. Through blending such diverse forms of knowledge, mindlines can simultaneously contend with complexity and support rapid decision-making at the most relevant time and place. Mindlines therefore represent more actionable forms of knowing that guide behaviour and clinical practice.

Unlike guidelines, mindlines rapidly draw upon evidence from settings that are congruent with the situation, i.e. "knowledge-in-practice-in-context" (Gabbay and le May, 2011: 64). Thus the manner in which a condition is regarded, the "illness-disease construct" (Gabbay and le May, 2011: 185), underpins the formation of mindlines, and is subjected to joint sensemaking in a patient-clinician consultation. However, individual and collective mindlines can become ingrained over time, consequently shaping our behaviour, identity, and the world we live in. Furthermore, mindlines are both "fast" and "slow" in thinking; influenced by unconscious processes yet time-consuming to develop and update (Gabbay and le May, 2023). This indicates a shift from the original divergence between "fast" system 1 thinking that is emotional and unconscious and "slow" system 2 thinking that is logical and conscious (Kahneman, 2013: 16). It should also be noted that the concept of mindlines is rooted in an interdisciplinary field of theories. A more detailed explanation of this is provided below.

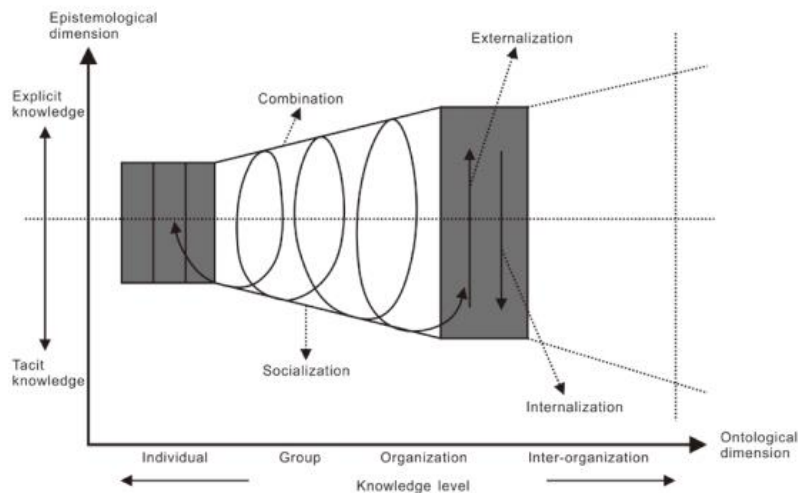
## 4.5 Theories that underpin the mindlines model

As discussed previously, the mindlines model is informed by multiple theories (Gabbay and le May, 2011). Most prominent is the influence of the SECI spiral of knowledge creation (Nonaka and Takeuchi, 1995) on how mindlines are proposed to develop. The SECI spiral draws upon Japanese philosophy that emphasises the oneness of body and mind, and the value of self-knowledge in augmenting knowledge of the external world (Nishida, 1990). For instance, the concept of “active intuition” indicates a stage at which knowing and doing collide when, for instance, providing a response without conscious reflection (Nishida, 1935). This emphasises the importance of fully using one’s mind and body order to achieve true knowing, which aligns with the idea that infusing ourselves with external objects is imperative in contextualising and fully knowing them (Polanyi, 1966). Thus, knowledge creation can be amplified through integrating the self with others and the wider environment (Nonaka and Konno, 1998). This sense of union across space and time aligns with Japanese philosophy in which “all things in the entire world are linked with one another as moments” (Dogen, 2021: 7:3). Here, time is in a state of endless flow rather than sequentially divided into the past, present, or future. Similarly, mindlines rapidly converge multiple points in time and space within a single moment to generate actionable forms of knowing that are continually evolving.

The tacit knowledge that contributes to the spiral includes both cognitive elements (i.e. beliefs and perceptions) and technical know-how that are primarily experiential, context-specific, and refer to knowledge of the present or beliefs about the future (Nonaka and Takeuchi, 1995). Polanyi (1966) argued that all knowledge is either tacit or stems from this dimension. For instance, personal experiences can shape the scientific knowledge that is discovered (Polanyi, 1958). Tacit knowledge also forms the basis of our identity (Brown and Duguid, 2001). Conversely, explicit knowledge is context-free, based upon theory and related to previous events (Nonaka and Takeuchi, 1995). It is possible that this may account for the infamous delay in embedding research into practice (Morris et al., 2011). Indeed, Nonaka and Takeuchi (1995) reported that tacit knowledge was a stronger predictor of success for Japanese companies than the explicit knowledge that could be documented. Furthermore, tacit knowledge can help to make explicit knowledge more actionable (Ryle, 1949), and has been described as the underpinning basis of EBP (Thornton, 2006).

Figure 4.1 below provides an overview of the SECI spiral.

**Figure 4.1: SECI spiral**



Copyright: (Nonaka and Takeuchi, 1995)

The spiral comprises four elements:

- i) **Socialisation** – People transfer tacit knowledge (e.g. technical skills, beliefs) to each other through shared experiences, observation, and interaction.
  - ii) **Externalisation** – The tacit knowledge is made more explicit through the collective attribution of meaning. This is predominantly done through informal interaction and can be supported through the use of stories, metaphors, and analogies.
  - iii) **Combination** – Other forms of knowledge (e.g. guidelines) are combined with the externalised knowledge. At this stage, the latter can help to make sense of the former.
  - iv) **Internalisation** – The combined knowledge is transformed in light of prior knowledge and experience. If the transformed knowledge is consistent with previous understanding, it is converted back into tacit knowledge and internalised (Gabbay and le May, 2011).
- Mindlines emphasise the additional importance of contextual relevance and adroitness (Gabbay and le May, 2011).

The knowledge that is ultimately integrated into one's mindlines is then shared as the SECI spiral continues. Furthermore, new knowledge is created when tacit and explicit knowledge interact at the stages of externalisation (tacit to explicit) and internalisation (explicit to tacit). A major implication of the spiral is that the tacit knowledge that we develop during socialisation shapes how new information is interpreted. The latter, then, is constantly added to, transformed, and negotiated with the former before being internalised. This reflects an iterative, rather than linear, process through which mindlines develop.

Having discussed the union of: i) self with others and ii) different knowledge forms underpinning the SECI spiral, an overview of broader concepts that underpin the mindlines model will be provided. These relate to socialised knowledge, actions, and our experience of reality, and are summarised in table 4.2 below.

**Table 4.2: Concepts that inform the mindlines model**

Dimension	Explanation
Knowledge	Belief is a pre-condition for knowing, which is either tacit or stems from this dimension (Polanyi, 1966). Our understanding of reality is acquired through socialisation (Berger and Luckmann, 1966). Mindlines are developed and reinforced through informal interaction. Examples include the influence of peers or one's soft skills. Collective mindlines are more robust when there is less individual variation (Gabbay and le May, 2011).
Actions	Our actions influence and are shaped by a "negotiated social order" (Strauss, 1978), i.e. perceived roles, and what we believe others will think, leading to a "social construction of justification" (Weick, 1995: 21). We also make use of relevant knowledge from settings that are congruent with the situation, i.e. "knowledge-in-practice-in-context" (Gabbay and le May, 2010: 64).
Reality	There are several ways of experiencing the world, and therefore multiple "realities". These are underpinned by a "duality of structure" (Giddens, 1986: 531), in which society shapes our actions and vice versa. For example, policies can shape individual mindlines and practice and vice versa.

These dimensions are inevitably inter-related, such that knowledge influences one's actions and reality, and vice versa. The section that follows presents an overview of how mindlines have previously been applied in health-related settings.

## 4.6 Mindlines literature

Mindlines have been alluded to in a number of health care contexts, including primary care (Grant et al., 2013) malaria diagnosis (Chandler et al., 2008), and pelvic floor surgery (Ducey et al., 2020). In recent years, there has been a growing interest in how mindlines can be revised. For instance, Wye et al. (2019) explored the activities of a knowledge mobilisation team consisting of researchers and policymakers. The authors reported that researchers were more able to influence the mindlines of commissioners through conversation than research results. Additionally, Cowdell et al. (2020) worked alongside individuals with, and parents of children with atopic eczema and practitioners to co-design strategies to modify eczema mindlines. These included an animation, teacher resource pack, and postcards (Cowdell, 2023). Thus, recent work highlights the relevance of mindlines to lay people as

well as practitioners. Another study involved the use of forum theatre (Beckett et al., 2023) to present diverse forms of knowledge (including patient, practitioner and research evidence), thus capitalising on the social process through which evidence reaches practice (Gabbay and le May, 2011). This helped to revise practitioner mindlines in relation to the psychological impact of injury (Beckett et al., 2023). An additional strategy to alter mindlines encompassed the use of “mindlines-producing conversations” to improve diabetes control in General Practices (Epling et al., 2021). This involved considering issues such as whether the practice accepts the evidence or adapts it to the context. Furthermore, knowledge-brokering to encourage “research-informed commissioning” and “commissioning-informed research” has been utilised (Wye et al., 2020).

Mindlines are also a useful lens for understanding how knowledge regarding GWG is shared amongst pregnant women and midwives. Indeed, the powerful influence of cultural norms and organisational culture allude to the social influences that shape how new information (e.g. research evidence or guidelines) is interpreted, and whether it is integrated into one’s mindlines. For pregnant women, this could entail a rejection of current dietary advice if persistent beliefs in eating for two have become ingrained. Moreover, individual and collective mindlines can become ingrained over time; consequently shaping our behaviour, identity, and the world we live in. This indicates a need to enhance midwives’ mindlines in relation to GWG. Consequently, mindlines can serve as a vehicle for mobilising complex knowledge regarding GWG.

EBP holds specific relevance to the aims to enhance midwives’ mindlines in relation to GWG and ensure that they feel more prepared to have culturally sensitive consultations about weight with South Asian women. For instance, insufficient knowledge about the causes of obesity can contribute towards weight stigma within healthcare and society (Puhl and Heuer, 2010). Furthermore, misconceptions about GWG and obesity during pregnancy may hinder the quality of clinical practice and guidance (Nagpal et al., 2021). It should also be noted that the literature reviews (chapter 3) identified experiential knowledge (such as a lack of time and concerns with causing offence) that was influencing current practice. Consequently, addressing the gap between scientific and public knowledge is a crucial endeavour in confronting weight-related stigma (Rubino et al., 2020). As such, strategies to support midwives with their consultations should also be informed by research evidence regarding GWG.

### **A reflexive account of my methodological perspective**

The influence of own ontological and epistemological beliefs upon my decision to use mindlines as a methodological framework is clear. For instance, I do not assume that reality is an objective entity, independent of the minds of individuals. Instead, I believe that our reality is the product of what we focus upon. In other words, our attentional focus, perceptions, and reactions exert a powerful impact on our interactions and events around us. This can result in multiple perspectives or “realities” that characterise our experiences. For instance, I have often found that when I or others fixate on certain events or circumstances, a self-fulfilling prophecy often arises in which similar situations occur.

My beliefs also reflect a soft view of social constructivism (Freidson, 1988). Broadly speaking, then, any phenomenon can be experienced on a physical and psychosocial level. I therefore believe that certain illnesses are real, but that clinical groups can influence the manner in which they are defined and managed. It is possible, then, that this had an impact on the manner in which I analysed and interpreted the descriptions of midwives and pregnant women.

During the course of this study, I experienced time as both transitory and in a state of suspension whilst I immersed my attention towards different thesis chapters. My awareness became locked into the present moment and the tasks at hand, yet the days zoomed past. I felt work and home life frequently merge into one; particularly during the COVID-19 pandemic. This reflects a state of endless flow of time, which mirrors the capacity of mindlines to draw upon knowledge from the most relevant space and time.

## **4.7 Research Methodology**

Ontologically, this study stemmed from a constructivist perspective, in which there is no single objective reality, but rather multiple realities experienced by individuals and groups. These are shaped by an ongoing dialogic cycle between an individual or collective belief and knowledge structures and events in the external world. Here, the world both reflects our ideas and shapes the formation of them. Epistemologically, this highlights the social, context-dependent nature of knowledge. This highlights a need to understand experiences from the perspectives of the individuals involved (Schwandt, 2000). Therefore, a qualitative approach to the study was highly pertinent. Furthermore, the interconnected nature of perspectives, actions and experiences required a systematic approach to exploring the understandings of midwives and pregnant women. This study is underpinned by the use of qualitative exploratory research and co-design. The sections below provide a discussion of these.

### **4.7.1 Qualitative exploratory research**

Exploratory research can be understood as "a broad-ranging, purposive, systematic, prearranged undertaking designed to maximize the discovery of generalizations leading to



description and understanding of an area of social or psychological life.” (Stebbins, 2001: 3). It often involves a qualitative, in-depth exploration of a topic that has not previously been studied in detail (Hunter et al., 2019). In addition, exploratory research primarily involves an inductive approach, with some deductive reasoning about the emerging conceptual framework, and requires a flexible, open-minded attitude when exploring data (Stebbins, 2001). Exploratory qualitative research is therefore highly pertinent for exploring the complex, multi-faceted sources that constitute women and midwives’ mindlines.

#### **4.7.2 Co-design**

Co-design is a form of participatory research that engages a range of stakeholders to incorporate contextual knowledge from diverse perspectives. It typically involves joint working between the public, practitioners, and researchers towards a common goal. Co-design largely involves patients and staff working together to improve or develop solutions, whilst co-production often involves implementing the proposed solution to improve patient services and the relationships between staff and service users (Robert et al., 2022). However, the terms are used interchangeably within this contested field (Williams et al., 2020). In health, knowledge should be combined from diverse groups in order to incorporate experiential as well as scientific knowledge (Kickbusch and Gleicher, 2012). Notably, Walker et al. (2020) advocate the use of co-design in maternity care to address discrepancies in guidance and practice in the provision of weight management support and lifestyle advice.

Co-design has been classed as a form of “mode 2 knowledge production” (Langley et al., 2018) in which knowledge is created within the context that it will be applied (Gibbons et al., 1994). Whilst mode 1 involves a predominantly academic context in which problems are framed and resolved, mode 2 includes a wider set of practitioners working on a problem defined in a localised context, and embraces the intricacy of contextual factors rather than attempting to control for them (Gibbons et al., 1994). This is therefore conducive to the enhancement of mindlines. Co-design also addresses the complexity of the real world through its emphasis on the accessibility of research findings and knowledge for the people it is created for. It therefore provides an ideal setting to address calls for dispersed knowledge and practices to be re-embedded in local conditions (Brown and Duguid, 2001; Giddens, 1990). In uniting the multiple perspectives or realities of its stakeholders, co-design is more likely to succeed in translating knowledge into action (Langley et al., 2018). This is supported by evidence that interventions that are co-designed with end-users have the potential to be more useful in practice (Santin et al., 2019; Tsianakas et al., 2015). Consequently, co-design is a pertinent method for drawing upon knowledge-in-practice-in-context and combining both explicit and tacit knowledge.

### ***Experience-Based Co-design***

Experience-Based Co-design (EBCD) (Bate and Robert, 2007; Robert et al., 2015) can support collaborative working between staff and patients (Blackwell et al., 2017; Tsianakas et al., 2012). The framework incorporates five main stages:

1. Interview and observe staff and service users to develop a contextual understanding of their experiences.
2. Add the interviews to a film.
3. Share the film with staff and service users, who then agree upon areas for improvement.
4. Hold co-design workshops to work on the improvements.
5. Invite staff and service users to a celebration and review event.

This study will use an adapted version of the EBCD framework by developing an understanding of staff and service users and using this to inform the content of co-design workshops. However, the celebration of success that takes place 6-9 months after co-design within EBCD is beyond the scope of this project.

### ***The value of co-design***

Collaborative methods provide a space for collective reflection, and consequently foster the mutual cultivation of research and the knowledge within mindlines (Gabbay and le May, 2023). Furthermore, tacit knowledge can be mobilised through meaningful dialogue (Nonaka and Takeuchi, 1995). Thus, the collective, rigorous appraisal of diverse evidence within co-design can support the deciphering of individual and collective mindlines. Co-design also provides a supportive context for initiating change and promotes effective facilitation. These, alongside a holistic approach to evidence, have been advocated as core components in moving evidence into practice (Cranley et al., 2017; Dryden-Palmer et al., 2020). Through fostering values such as an inclusivity of different viewpoints and a transparency of the remit that participants can challenge (Co:Create, 2020), the context is conducive to change and effective facilitation is realised. It has been argued that this form of meaningful engagement should be tied to values linked to the right to health (Stuttaford et al., 2017).

Crucially, exploring what people make can provide a gateway to accessing deeper levels of experience in relation to what they feel, know, and dream (Sanders, 2002), thus aiding the externalisation of tacit knowledge. Additionally, the process of collective making can help to personify research findings through mediums such as role play (Langley et al., 2018). This blending of diverse knowledge is just one of many outcomes of collective making, which can have a multi-layered influence on the following (Langley et al., 2018):

1. Participants (e.g. by giving them a voice and providing shared understanding).

2. Knowledge (e.g. through sharing, synthesising, and creating new knowledge).
3. Implementation (e.g. through the creation of an artefact that embodies the combined, context-specific knowledge and is thus more likely to be acted upon).

The investment of time and resources within co-design is also recompensed through its potential for widespread impact; extending beyond individuals and groups to broader levels incorporating societal and paradigmatic impacts such as national public engagement and the generation of new ideas (Beckett et al., 2018). Thus, addressing the origins of mindlines (which themselves stem from a multitude of sources) can help to initiate social change. However, careful facilitation is imperative to ensure full participation amongst co-designers, and can potentially lead to positive changes in their values and behaviours (Robert et al., 2022).

Brocklehurst et al. (2021) juxtapose traditional evidence-based paradigms with co-design. Notably, knowledge in the former has a hierarchical structure, favouring certain forms of evidence over others. Conversely, co-design includes diverse stakeholders in addition to research evidence, thus denoting a flat structure. Reasoning in the latter is also abductive (in which inferences based upon the most likely explanation are formed) rather than deductive, and “truths” are relative to the individual or society. Consequently, co-design is congruent with the social, multifaceted process through which knowledge can be transformed and integrated into mindlines. Indeed, it is a useful medium through which tacit understanding of the past, present, and imagined future can be unified. Therefore, the potential to amend or enhance mindlines is amplified.

### ***Co-design in the current context***

At the time of research planning, the majority of social distancing restrictions had only recently been lifted (Public Health England, 2021). In accordance with Faculty ethics committee guidance, remote methods of data collection were prioritised for all research stages. However, it remained imperative to consider the most appropriate mediums for the groups. For instance, a lack of confidence in using technology and unstable internet connections may inhibit full engagement in virtual workshops (Langley et al., 2021b). Alternatively, the use of additional methods that address the engagement needs of diverse groups can enhance inclusivity (Davis et al., 2021a; Langley et al., 2021b). It should be noted that co-design can take place in asynchronous as well as synchronous settings – each of which can arise in a different space or one that is the same (Langley et al., 2021b). For instance, Wallace et al. (2021) posted activities to a participant, which were then distributed to other participants for their input within a “pass-the-parcel” approach. Additionally, Langley et al. (2021a) adopted hybrid approach to co-designing processes and resources in serious

incident investigation. Here, collaborative activities were distributed through post, and individuals accessed a shared digital design canvas independently. Since no single method can evade barriers to participation, a blended approach to co-design, involving several techniques, can help to counteract these (Langley et al., 2021b).

It has been noted that tacit knowledge is largely externalised through informal interaction (Nonaka and Takeuchi, 1995). As such, the virtual workshops provided a social context for shared experiences and mental models to surface. It is possible that the pre-workshop activity allowed participants to reflect upon their roles and goals more readily, thus aiding the externalisation of contextually embedded tacit knowledge. Therefore, a blended approach to remote co-design has the potential to uncover and combine diverse forms of knowledge. Incidentally, this mirrors the extensive ability of mindlines to tap into multiple contexts across different points in time.

## **4.8 Summary and approach**

As discussed in the Introduction (chapter 1), mindline enhancement and amendment offer an invaluable approach to mobilising knowledge regarding GWG. Mindlines embody the complex, socially driven manner in which knowledge influences practice. Mindlines are bounded yet flexible, intuitive yet context-sensitive, and developed through early learning yet adapted through later experience. They swiftly combine knowledge from a wealth of sources in order to influence our actions. This conflicts with the largely fragmented nature of scientific evidence and experiential knowledge in relation to GWG. It is therefore imperative that relevant research evidence is effectively melded with midwifery mindlines to influence practice. Consequently, an interaction is needed between diverse forms of knowledge – namely the explicit knowledge within research evidence and the tacit knowledge of midwives, South Asian pregnant women and/or new mothers.

## Chapter 5 Methods

### 5.1 Introduction

The previous chapters have provided an overview of the epidemiology of excessive GWG (chapter 2), research evidence regarding the experiences of midwives and pregnant women (chapter 3), and the mindlines model that underpins this study (chapter 4). This chapter will begin with a high-level summary of how the mindlines model was practically applied to amend and enhance midwives' GWG mindlines. Subsequently, a detailed description of the methods that underpinned each research stage will be provided. These included the following three stages: i) interviews to explore how midwives' and South Asian pregnant women's GWG mindlines have developed, ii) virtual co-design workshops to co-design prototype strategies that will help midwives to have culturally sensitive consultations about weight with South Asian pregnant women, and iii) prototype feasibility testing with midwives. Finally, an overarching summary is provided of how rigour was achieved, and ethical considerations were adhered to.

### 5.2 Study design

**Aim:** To co-design prototype strategies to enhance midwives' GWG mindlines in relation to South Asian women in Birmingham.

The objectives are outlined below:

1. Explore how lay and professional GWG mindlines developed during *socialisation* and currently interact with each other. Support the *externalisation* of knowledge by asking for specific examples and stories.
2. *Combine* the knowledge from the interviews with research evidence in ways to support transformation and *internalisation* by co-designers.
3. Co-design prototype strategies that will help midwives to have culturally sensitive consultations about weight with South Asian pregnant women. These should *combine* the *externalised* practical understanding of these groups with research evidence and guidelines.
4. Develop and test the prototypes of strategies to ensure that the combined knowledge is transformed and can be *internalised* and used by midwives in Birmingham.

Qualitative methods formed the basis of this study, since these enable a thorough exploration of individual experiences and participants' underlying beliefs and perceptions (Tuckerman et al., 2020). This richness of data makes qualitative methods particularly valuable in health research, in which person-centred approaches are crucial (Renjith et al.,

2021). In addition, the manner in which mindlines develop provides an insight into how they can be enhanced. Furthermore, contextual adroitness (situational knowledge) is an important facet of mindlines (Gabbay and le May, 2011). Consequently, this study was underpinned by the intention to unify tacit understanding with research evidence in order to enhance midwives' GWG mindlines. Indeed, this fusion of multiple sources of evidence is more closely aligned with the holistic concept of EBP discussed previously (Sackett et al., 1996). As such, the research stages in this study were aligned to the SECI spiral. Table 5.1 provides an overview of the research objectives and methods across each stage of the study. These are accompanied by a summary of which stages of the SECI spiral these aligned with. The relevant sub-sections after this provide a more detailed summary of how the objectives were achieved.

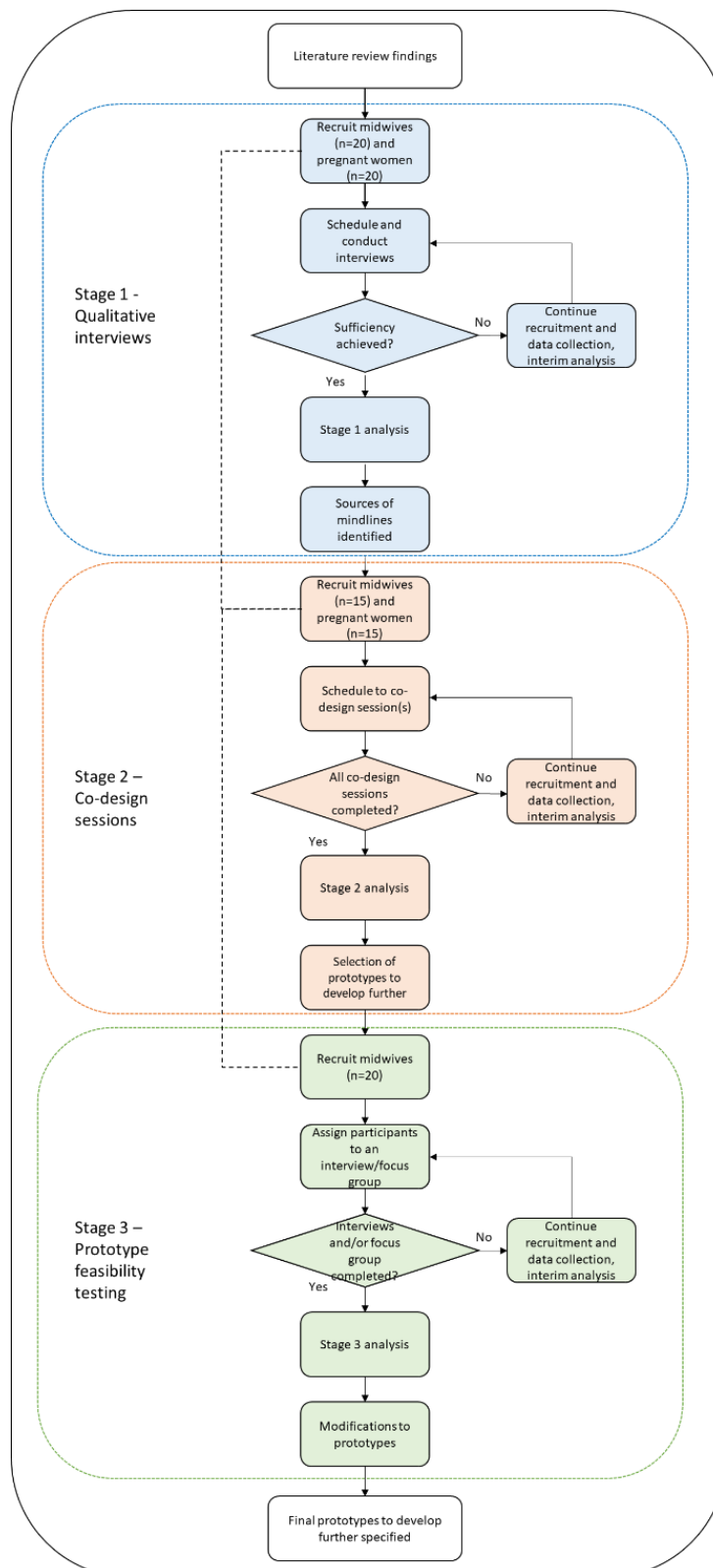
**Table 5.1: Study objectives**

Objective	Research method	Stage of SECI spiral
1. Explore how lay and professional GWG mindlines developed during <i>socialisation</i> and currently interact with each other. Support the <i>externalisation</i> of knowledge by asking for specific examples and stories.	Qualitative interviews	Socialisation and externalisation
2. <i>Combine</i> the knowledge from the interviews with research evidence in ways to support transformation and <i>internalisation</i> by co-designers.		Combination and internalisation
3. Co-design prototype strategies that will help midwives to have culturally sensitive consultations about weight with South Asian pregnant women. These should <i>combine</i> the <i>externalised</i> practical understanding of these groups with research evidence and guidelines.	Virtual co-design workshops	Externalisation and combination
4. Develop and test the prototypes of strategies to ensure that the combined knowledge is transformed and can be <i>internalised</i> and used by midwives in Birmingham.	Prototype feasibility testing	Internalisation

Table 5.1 indicates that the proposed sequence of the study did not wholly resemble the SECI sequence that was originally proposed – a finding similarly reported by Gabby and le May (2011). Rather, it was imperative to externalise and combine several times before internalisation could occur, thus signifying spirals within a spiral. Figure 5.1 below provides a

summary of the study. Each stage is explained in further detail towards the end of this chapter.

**Figure 5.1: Overview of study**

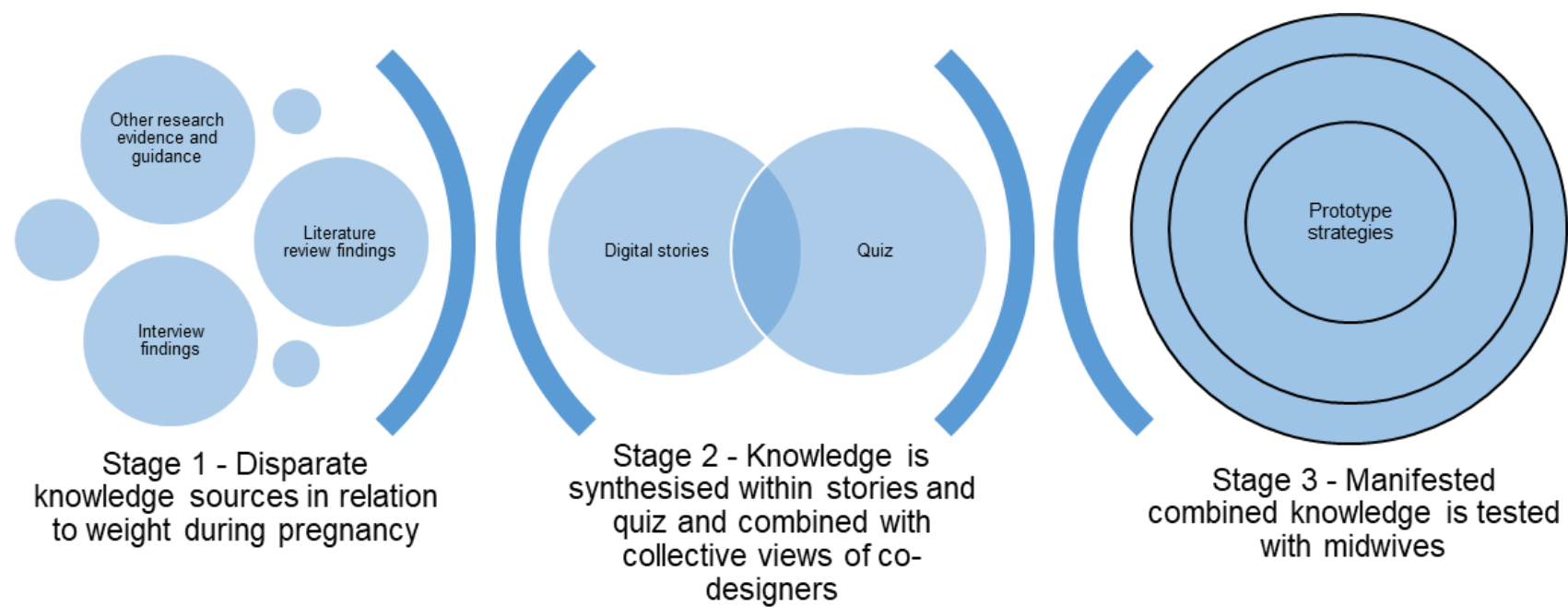


“Boundary objects” (Star and Griesemer, 1989) can be understood as entities (e.g. documents or artefacts) that represent the knowledge of multiple groups. Through conveying different meanings, boundary objects are able to unite different social worlds. Moreover, they



have the potential to resolve knowledge boundaries through shared language and facilitating the collective transformation of knowledge (Carlile, 2002). Thus, boundary objects intersected each study phase before ultimately embodying the enhanced mindlines within the prototype strategies. Figure 5.2 below provides a representation of these. Here, the knowledge was mobilised across several stages with the intention of enhancing midwives' mindlines and gradually became more refined during this process.

**Figure 5.2: Boundary objects across each study phase**



### **A reflexive account of my mindlines in relation to weight**

Although wellbeing and fitness have been my main motivation for remaining active, I have unintentionally lost almost two stone over several years. I began to feel more comfortable in fitted clothing, and enjoyed the feelings of confidence that came from the positive comments of others. My enthusiasm for running has remained consistent over the years. More recently, however, I became aware of my own self-critical ruminations about weight when increasing my physical activity through longer running sessions and more frequent walks due to concerns about gaining “lockdown weight” during the pandemic. A year later, this extended to frustration when pain from an ovarian cyst restricted the scope of exercise that I could engage in. I found myself trying to compensate with “exercise snacks” and more yoga sessions. In an increasingly visual, selfie-obsessed culture, the possibility of my own internalised weight stigma was evident. Embodied weight stigma has been noted amongst individuals attending weight loss groups in their perceived individual responsibility for health (Williams and Annandale, 2018). Inevitably, then, my personal attitudes to weight had an influence on the knowledge spiral that I planned to initiate amongst my participants.

I also reflected on my family background, which unveiled the paradoxical influences on South Asian mindlines – largely reinforced by older female relatives. Specifically, it seemed that being larger was considered a sign of strength and good health, which conflicted with the stigma revealed in covert comments about the weight gain of others in the local community.

As such, I became mindful of feeling like both an insider and outsider within South Asian culture. It has been noted that the researcher is never wholly an insider or outsider due to inherent differences in the experiences within groups (Dwyer and Buckle, 2009; Serrant-Green, 2002). Invariably, it seems that researchers are part of “the space between” (Dwyer and Buckle, 2009: 60) due to their research-based knowledge of a topic.

## **5.3 Stage 1 – Qualitative interviews**

**Aim:** To explore how lay and professional GWG mindlines developed during *socialisation* and interacted with each other. The experiences of both groups were crucial in uncovering a shared understanding of weight during pregnancy, since midwives are a woman’s first and most frequent source of formal contact. In addition, knowledge was *externalised* in relation to the following:

- i. South Asian pregnant women’s experiences of receiving support with weight management.
- ii. Midwives’ experiences of advising and supporting women with weight management, with a particular focus on those with South Asian women.
- iii. How midwives’ and South Asian women’s GWG mindlines developed.

### 5.3.1 Design

Exploratory qualitative interviews (Stebbins, 2001) were selected to uncover a detailed understanding of how mindlines were created and being influenced. This was underpinned by a mindlines-informed approach to the development of the interview schedules (appendix 1 and 2). These sought to elicit a detailed understanding of how lay and professional GWG mindlines were constructed during socialisation and interacted with each other. Specifically, the interview schedules consisted of open-ended questions of how knowledge was constructed, used, and influenced decision-making in relation to weight management or the support of this. This facilitated subsequent comparison and *combination* of the interview findings with the literature review findings (chapter 3).

The use of a semi-structured approach to interviews also enabled flexibility in eliciting perspectives and experiences whilst addressing the research questions (Bryman, 2016). Interview schedules developed iteratively over the course of data collection. Whilst the initial schedules were informed by literature review findings (chapter 3), a more flexible approach was adopted with subsequent versions (appendix 1 for pregnant women and appendix 2 for midwives). This helped to determine the most influential catalysts of behaviour or practice, e.g. family or organisational norms.

### 5.3.2 Participants

#### *Inclusion criteria*

Individuals from the following groups were invited to take part in interviews between June 2020 and September 2022:

- Midwives/final year student midwives in England to account for practice aligned to national maternity policy (NHS England, 2022) (n=up to 20). The latter were included in light of evidence that final-year student midwives have acquired skills and strategies to address the requirements of registration (Carolan-Olah et al., 2014).
- Pregnant women (including those who are South Asian) in England (n=up to 20).

A figure of twenty was selected due to the need for data sufficiency (i.e. adequate identification of codes, themes and their dimensionality) (Young and Casey, 2019). It was expected that this would be achieved after around twelve interviews with each group (Guest et al., 2006). Pregnant women from a non-South Asian background were included due to challenges with recruiting South Asian women. However, women from diverse ethnic backgrounds were included, and their perspectives helped to clarify which findings were unique to those from a South Asian background. It was anticipated that this would help to highlight nuances in how South Asian women's mindlines developed.

### *Exclusion criteria*

The exclusion criteria were as follows:

- Pregnant women who were under the age of 18.
- Midwives or pregnant women who were not based in England.
- Student midwives who were not in their third year.

### **5.3.3 Recruitment**

Purposive and snowball approaches were adopted to recruitment, which are described in further detail below. The former was used as it can help to ensure a thorough understanding of the contextual knowledge of these groups (Patton, 2002). Snowball sampling ensured a pragmatic, flexible approach to identifying future participants, and involved asking participants to ask other relevant individuals to participate. This aided in an inductive approach to data analysis by allowing sufficient breadth for newer themes to emerge and be captured (Miles et al., 2014). Consequently, a diverse range of methods were utilised in an effort to develop trust and relationships with pregnant women from this community (Farooqi et al., 2018). The different methods of participant recruitment for each group are described below.

#### ***Pregnant women***

Hospital and community-based locations formed the main categories of recruitment. The former involved the support of Sandwell and West Birmingham NHS Trust and Birmingham Women's and Children's NHS Foundation Trust, as these trusts have a high percentage of women from Asian or Asian British backgrounds (36% and 26% in May 2021 respectively (NHS Digital, 2021)). Research midwives at Birmingham Women's and Children's NHS Foundation Trust shared a copy of the invitation letter with my contact details (appendix 3) with South Asian pregnant women who were currently on their caseload. Research midwives also placed posters advertising the study with my contact details (appendix 4) in the maternity waiting area. In addition, electronic copies of the posters were placed on the Trust's Facebook page.

Through discussions with the Equality, Diversity and Inclusion Lead Midwife at Sandwell and West Birmingham NHS Trust, I was signposted to the Communications team and invited to participate in a talk show on Raaj FM – a radio station that provides Punjabi programmes across the West Midlands (Raaj FM, 2022). I also discussed the study and the importance of healthy GWG on a Health Talk show on Kanshi TV (sky 772). A YouTube link to this can be found in appendix 5. Other recruitment methods included: i) contact with community

organisations, ii) word-of-mouth, and iii) the use of social media. The following community organisations were contacted to share details of the study and electronic copies of the poster: local antenatal groups, Children's Centres, nurseries, a Women's Health Network in Bradford, community groups, and charities. The word-of-mouth technique involved sharing a copy of the poster with friends, family, and colleagues via Facebook and WhatsApp, and requesting that they share this with relevant groups or individuals that they came into contact with. The use of social media involved: i) advertising the study on Call for Participants (an online platform that connects researchers with suitable participants via screening questions), and ii) creating Facebook advertisements in which pregnant women of a South Asian background were targeted.

Women who contacted me via e-mail or telephone were given or e-mailed a participant information sheet (appendix 6) that provided my e-mail address and telephone number if they wished to ask any questions or express their interest in the study. The information sheet also informed women about stage 2 of the study.

### **Midwives**

The following strategies were used to approach midwives and final-year student midwives across England:

- Research midwives at Sandwell and West Birmingham NHS Trust and Birmingham Women's and Children's NHS Foundation Trust circulated an e-mail in relation to the study to all midwives. This included a brief letter from me alongside my contact details (appendix 7). The research midwives also shared an electronic copy of the poster advertising the study (appendix 8) with their WhatsApp and Facebook midwifery groups.
- I contacted the Royal College of Midwives (RCM) (an organisation that promotes quality in midwifery practice and champions the voices of midwives and maternity support workers across the UK) and All4Maternity (an online platform to support shared learning in Maternity care) and requested that they share an electronic copy of the poster with their Twitter and Facebook groups.
- I made use of word-of-mouth by asking University colleagues to share details of the study with other midwives via e-mail and social media.
- I advertised the study on Call for Participants.

Midwives who expressed an interest were provided with a participant information sheet (appendix 9) and had an opportunity to ask any questions and receive answers by contacting me via e-mail or telephone. The information sheet also informed midwives about

stage 2 of the study, and that they could contact me if they had any queries in relation to this or were interested in participating.

All participants were provided with the option of being interviewed online (via Microsoft Teams) or in person (if current Covid guidance allowed) at a time and venue that was convenient for them. If participants preferred to be interviewed in person, the Birmingham City University lone working policy was adhered to (Birmingham City University, 2021). In addition, a risk assessment and research activity approval form were completed to ensure that any face-to-face research was undertaken in a COVID-safe way. Face-to-face interviews were planned to take place in a quiet space in which the discussion cannot be heard, e.g. an office or pre-booked study room at the University, or a venue of the participant's choice. Individuals who were interested in participating after receiving an information sheet were provided with a consent form (appendix 10). They were asked to sign this (by typing their full name) and return this through e-mail before an interview was arranged. Participants also received a signed copy of the consent form with my signature. If they had a hard copy, they were asked to take a photograph of it with their signature and e-mail it back to me. Pregnant women also had the option to provide verbal consent over the telephone to me, which was audio-recorded.

Rapport-building is integral in ensuring comfortable interactions in qualitative interviews, and should be established both before and during the interview (McGrath et al., 2019). As stated previously, all interviewees received a short summary of the study within the information sheets. Following their consent, they received clear, courteous e-mails inviting them to be interviewed at a date that was convenient for them. During the interviews, my non-judgemental stance was emphasised from the start through emphasising that I would like to "walk in (their) shoes" (appendix 1 and 2). In addition, empathy was conveyed in reaction to participant responses, which is a central component in establishing rapport (Prior, 2017). Participants were also invited to complete an anonymous demographic details form (appendix 11). This method was selected instead of asking for details to safeguard their desire for privacy if they were not willing to disclose their details. The form helped to provide a descriptive overview of participant characteristics, which aided in contextualising the findings and accounting for potential differences across participants. The interviews were planned to last for a maximum of one hour and were recorded and transcribed verbatim.

#### **5.3.4 Data collection**

Interviews began with introductions in which a rapport was established with participants before a general overview of the study was provided. This was followed by requesting

confirmation of consent to participate. A flexible approach was adopted to the interview guide to allow sufficient space for participants to share their feelings and perspectives. Both groups were asked what their first thoughts are in relation to GWG, who and what they had taken most notice of, and why so as to externalise tacit knowledge in the form of beliefs and personal values. They were also asked what information they had been given and where it came from to identify the sources of their mindlines. Participants were asked to share their previous experiences of consultations with midwives/women, as well as what had and had not been useful sources of knowledge in relation to GWG. As a South Asian woman, I also drew upon my knowledge of cultural traditions such as the consumption of Indian sweets and clarified butter (desi ghee) to explore the strength of cultural influences. The interviews were recorded in Microsoft Teams and transcribed in Microsoft Word by myself. The transcripts removed identifying information to ensure anonymisation.

### **5.3.5 Data analysis**

An overview of the demographic data was provided through individual summaries of the two groups. These captured the age group (to group data for women), ethnic category, region of residence (amongst women) and place of work (of midwives), level of experience in midwifery, and midwifery setting amongst midwives. In addition, a summary of the above grouped by number and percentage was produced for each group to support a descriptive summary of the range of findings.

Framework Analysis provides a structured approach to summarising data within and across participants (Goldsmith, 2021). It can be used to address a range of research questions, including those that are contextual (e.g. the nature of experiences) and diagnostic (e.g. underlying factors of perceptions or actions) (Ritchie and Spencer, 2002). It is also sufficiently flexible to generate inductive and deductively-derived themes (Goldsmith, 2021), and accommodates issues that are important to participants as well as the research questions (Parkinson et al., 2016). In addition, my view of integrated nature of beliefs, emotions and experiences was consistent with the process of framework analysis. Here, experiences stem from lower-level beliefs, emotions and perceptions. As such, framework analysis provided a suitable structure for unpicking the experiences of women and midwives. For example, the initial codes helped to capture their responses to events, whilst the framework categories provided an organising dataset through which to group how they experienced the former.

Following transcription, initial codes and examples from the data were captured within a spreadsheet in Microsoft Excel. The codes were grouped into framework categories through



an additional column within this list. Framework categories were indexed separately for pregnant women and midwives. These were then organised in separate diagrams that highlighted the sources of mindlines amongst each group. In addition, an overarching diagram was produced, in which the sources of both groups' mindlines and the manner in which they interacted was captured. Data collection and analysis were iterative processes with early analysis informing later interviews (Srivastava and Hopwood, 2009). Framework analysis was also combined with a reflexive approach to interpretation.

### **5.3.6 How the findings were synthesised to inform Stage 2**

The interview findings (presented in chapter 6) were combined with the literature review findings (presented in chapter 3) through the use of flow charts to enable cross-comparison in Microsoft Excel. This provided a broad overview of existing evidence in relation to understandings of gestational weight management amongst midwives and pregnant women. These two sources of evidence were supplemented with scientific evidence in relation to effective weight management techniques during pregnancy. This was derived from the literature reviews and wider reading.

I dedicated considerable thought into how each of the above (experiential and scientific evidence) should be communicated to co-designers. I reflected that whilst a Powerpoint presentation could be informative, its didactic format conflicted with the manner in which mindlines develop. It struck me that helping co-designers to *internalise* the research findings was a crucial precursor of *combining* their practical knowledge with the research evidence. Thus, the mindlines of the co-designers served as an emblem of the mindlines that were the ultimate objective for enhancement. In other words, addressing their mindlines was a necessary precursor to ensuring that the final strategies enhanced midwives' mindlines. The different approaches to mobilising each type of knowledge are described in the design section for the co-design workshops below.

## **5.4 Stage 2 – Co-design workshops**

**Aim:** To support the enhancement of mindlines by co-designing prototype strategies that would help midwives to have culturally sensitive consultations about weight with South Asian pregnant women. These were based upon a *combination* of the *externalised* practical understanding of these groups and research evidence and guidelines. The objectives were as follows:

- i. To ensure a thorough and shared understanding of weight management during pregnancy between midwives, pregnant women, and new mothers. This was based

upon a combination of the externalised practical knowledge and research evidence and guidance.

- ii. To form a shared understanding of what culturally sensitive consultations about weight with pregnant South Asian women should consist of. This was a combination of the externalised practical knowledge and research evidence and guidance.
- iii. To generate ideas of strategies to influence midwives' GWG mindlines in order to have culturally sensitive consultations about weight with pregnant South Asian women. These were based upon a combination of the externalised practical knowledge and research evidence and guidance.
- iv. To develop prototypes of the ideas (which represent the combined knowledge).
- v. To gather feedback from co-designers in relation to the prototypes of their ideas.

### **5.4.1 Design**

This stage involved drawing upon Experience-Based Co-design (EBCD) (Bate and Robert, 2007; Robert et al., 2015) by ensuring that the understanding of midwives and South Asian pregnant women informed the content of co-design workshops. This section provides a summary of how this, alongside scientific evidence in relation to GWG and findings from the literature reviews were mobilised for the co-design workshops. This is followed by an overview of how the research findings from the literature reviews and interviews were combined with co-designers' practical understanding to ensure that the sources of GWG mindlines informed the co-design of prototype strategies.

#### ***Mobilisation of knowledge for co-design workshops***

Having synthesised existing evidence and the Stage 1 interview findings, digital stories were chosen as the mode of presentation for the experiences of pregnant women and midwives. Stories are a universal method of communication that date back to prehistoric periods (Aubert et al., 2019; Boyd, 2018). Stories have been linked with greater levels of memory retention than facts (Bellana et al., 2022; Zdanovic et al., 2022). They have the potential to generate both patient and professional capital, which refers to the enhanced knowledge assets of these groups (le May, 2008). Furthermore, stories have been advocated as an effective method of enhancing the accessibility of knowledge and thus mindlines (Gabbay and le May, 2011). As such, stories held promise in facilitating *internalisation*.

After synthesising the literature review and interview findings, two scripts were written to summarise the experiences of pregnant women and midwives (appendix 12). These included the three vital elements of stories i) plot, ii) character, and iii) setting (Lamont, 2021). Quotations were included across each script to capture the essence of their

experiences and convey shared language. The latter is a vital component in supporting the collective sensemaking of tacit knowledge (Gabbay and le May, 2011). Subsequently, images were selected for each digital story. Voiceovers for each script were recorded alongside the two stories with the support of speakers who took on the role of the midwife and pregnant South Asian mother. Subsequently, these were converted into a video using Screencast-O-Matic software (2022).

The scientific research evidence in relation to effective weight management techniques was integrated within a quiz. The use of games within co-design can allow participants to actively make sense of research evidence and assimilate this with their own experiences before integrating this with their ideas (Langley et al., 2020). The gamification of the co-design process has been strongly advocated (Vaajakallio and Mattelmäki, 2014; Zhang et al., 2022). However, the need to incorporate room for collective sensemaking meant that it was more appropriate for games to comprise a segment of the process.

The questions within the quiz were based upon a combination of findings from the literature review and wider research evidence in relation to effective gestational weight management. This illustrated that the main modifiable determinants of healthy weight management are: i) nutrition, ii) physical activity, iii) emotional health, and iv) sleep. The experiential and empirical evidence that informed this is outlined in table 5.2. This knowledge was mobilised to the group to inform the co-design of strategies that would also mobilise this knowledge to enhance midwives' mindlines. The specific quiz questions and accompanying explanations are provided in appendix 13.

**Table 5.2: Summary of evidence for each dimension**

<b>Dimension</b>	<b>Evidence from reviews and wider reading</b>	<b>Knowledge that was mobilised</b>
Nutrition	Cravings were described as a barrier to healthy eating in the literature reviews (Goodrich et al., 2013; Groth and Morrison-Beedy, 2013; Groth et al., 2016; Hackley et al., 2014; Herring et al., 2012a; Nagourney et al., 2019; Wang et al., 2015b).	Guidance on how to address cravings/changes in appetite (Epel et al., 2019; Vieten et al., 2018; Weingus and Adams, 2022).
	Some women showed a lack of understanding of nutrition and portion sizes (Groth et al., 2016; Hackley et al., 2014). Others reported a lack of culturally tailored guidance from healthcare professionals (Darroch and Giles, 2016; Ngongalah et al., 2021).	The importance of natural foods in helping to prevent insulin spikes, and to lower cortisol levels, which supports a healthy metabolism (Jenkinson, 2020).  Culturally tailored guidance in relation to nutrition for South Asian communities (Jay, 2021).
	The health of the baby was described as a facilitator of healthy eating (Knight-Agarwal et al., 2022; Lee, 2016; Nagourney et al., 2019).	The mother's diet can influence the child's DNA and future health (Brzozowska et al., 2022; Chen et al., 2021).
Physical activity	Women were concerned about the safety of exercise (Davis et al., 2021b; Goodrich et al., 2013; Krans and Chang, 2012) but expressed more motivation when they were aware of the health benefits to mother (Davis et al., 2021b; Goodrich et al., 2013; Shum et al., 2022) and baby (Krans and Chang, 2011; Shum et al., 2022).  Staying physically fit and active can benefit the mother's health (DiPietro et al., 2019) and child's health (Chen et al., 2021).	Guidance on safe physical activity during pregnancy (Department of Health and Social Care, 2019) and the health benefits of this for the mother's health (DiPietro et al., 2019) and child's health (Chen et al., 2021).
Emotional health	Women's self-consciousness about their appearance led to a decline in their mental health (Davis et al., 2021b; Fletcher et al., 2018; Lindsay et al., 2019). Women also felt a lack of control over food intake (Fletcher et al., 2018; Herring et al., 2012a; Nagourney et al., 2019) and weight (Kominiarek et al., 2015; Lindsay et al., 2019; Nagourney et al., 2019; Wang et al., 2015a).	Guidance/signposting to resources to support emotional health during pregnancy (Fivexmore, 2022; Maternal Mental Health Alliance, 2022; Tommy's, 2022).

Dimension	Evidence from reviews and wider reading	Knowledge that was mobilised
	Stress can lead to an increased appetite and an increased risk of weight gain in adults (Chao et al., 2017). There was also evidence for emotional eating amongst pregnant women in China during the pandemic (Zhang et al., 2020).	
Sleep	<p>In the reviews, significantly less women gained excessive GWG when they received an intervention that included holistic content covering sleep hygiene (Gesell et al., 2015).</p> <p>There is a link between short sleep (&lt;6 hours) (and other sleep problems) and obesity (Ogilvie and Patel, 2017). There is also a positive association between sleep quality and duration and physical activity in pregnant women (Pauley et al., 2020; Pauley et al., 2022).</p>	Guidance on effective sleep hygiene during pregnancy (National Childbirth Trust, 2021).

### ***Combination of evidence with co-designers' practical understanding to ensure mindlines-informed prototype strategies***

The collective appraisal of research findings within the digital stories and quiz was fostered through open discussions and word clouds in Microsoft Teams. This also helped to ensure that the research findings were *combined* with the practical knowledge of co-designers. For instance, co-designers were asked to share their thoughts about the digital stories and quiz, and whether anything came as a surprise. These findings ensured a thorough insight into the experiences, beliefs, and personal values that influenced how GWG mindlines had developed and could be enhanced. Subsequently, tables for midwives and South Asian pregnant women were produced to summarise this. These provided an overview of each mindline-based challenge and corresponding solution that had been identified within Stages 1 and 2, alongside examples with quotations.

#### **5.4.2 Participants**

##### *Inclusion criteria*

The following groups were invited to take part in four virtual workshops between September and November 2022:

- South Asian pregnant women and/or recent mothers (up to 1-year post-partum) in England (n=15).
- Midwives or third year midwifery students in Birmingham (n=15).

##### *Exclusion criteria*

The exclusion criteria were as follows:

- Pregnant women or new mothers who were not from a South Asian background.
- Pregnant women or new mothers who were not from England.
- Pregnant women or new mothers who were under the age of 18.
- Midwives or third-year midwifery students who were not from Birmingham.
- Student midwives who were not in their third year.

It has been suggested that the optimum size for co-design groups is 8 (Portable, 2020). However, a target of fifteen from each group was selected for recruitment in the event that some participants withdrew from the study or did not attend particular sessions. Co-designers who attended every workshop were provided with £25 after participating as a token of thanks for their time (funded by the doctoral research college).

### 5.4.3 Recruitment

South Asian pregnant women and new mothers were recruited through the following methods:

- Discussing the Stage 2 co-design study with Stage 1 interview participants. Those who expressed an interest in Stage 2 were sent or given a participant information sheet (appendix 14).
- Research midwives at Birmingham Women's and Children's NHS Foundation Trust placed posters with my contact details advertising stage 2 of the study (appendix 15) in the maternity waiting area and the Trust's Facebook page.
- As previously discussed, I presented the study on Raaj FM and Kanshi TV.
- Electronic copies of the poster were shared with local antenatal groups, Children's Centres, nurseries, a Women's Health Network in Bradford, community groups, and charities.
- Word-of-mouth was used by sharing a copy of the poster with friends, family and colleagues via Facebook and WhatsApp, and requesting that they share this with relevant groups or individuals that they come into contact with.
- Local community engagement through attending library events in Derby, including rhyme time and story time to discuss the study with the local community. I also approached women in parks, supermarkets and clothing retail stores in Derby to ask if they knew relevant individuals or would be willing to participate in the study.

Women who contacted me through the above methods were given a participant information sheet (appendix 14) that provided my e-mail address and telephone number should they wish to ask questions or express interest in taking part.

The following strategies were used to recruit midwives:

- Stage 1 participants who expressed interest in Stage 2 were sent or given a participant information sheet (appendix 16).
- Midwives at Sandwell and West Birmingham NHS Trust and Birmingham Women's and Children's NHS Foundation Trust shared electronic copies of the poster with my contact details (appendix 17) with their Facebook groups.
- I created a Tiktok video in which I discussed the study. A link to this can be found in appendix 18.
- I shared the Tiktok video on Twitter and midwifery Facebook groups.
- I made use of word-of-mouth by informing family and colleagues of the study and asked them to share my contact details with relevant individuals.

The information sheet provided my e-mail address and telephone number to contact me with questions about the study or express interest in participating. Individuals who were interested in participating after receiving an information sheet were provided with a consent form (appendix 19).

#### **A reflexive account of participant recruitment for the workshops**

Although the recruitment of midwives and pregnant women was challenging during the interview stage, it was considerably more so for the co-design workshops. After having little success with social media and contacting community organisations to find South Asian women, I realised that less conventional methods were needed. Appearing on the television and radio were unexpected avenues that pushed me beyond my comfort zone of presenting, yet gave me a sense of fulfilment in recruitment and helping to raise awareness of the issue. However, this soon turned to frustration when these yielded little success in participant recruitment.

A family member's comment helped to shift my approach: "You can't expect people to respond to something like that. You won't like this Sereena, but you're better off approaching people directly." Approaching members of the public whilst they were locked in their daily routines felt a little rude. However, I made it my mission to approach women in parks, supermarkets, and retail stores, whilst accompanied by my Mother for moral support. Though daunting at first, it was heartening to witness women's willingness to sign up or spread the word about the study. To my relief, it was the one-to-one conversations with people in the community that boosted the uptake of South Asian pregnant women and new mothers. A similar situation arose when recruiting midwives. Despite reaching out through social media forums, individual discussions with colleagues and wider networks proved to be more productive. I remembered how important relationship-building is and felt more prepared for the co-design workshops as a result. Thus the shift in my perspectives on participant recruitment had an enabling effect on the research process.

#### **5.4.4 Data collection**

The purpose of the workshops was to co-design prototype strategies that combined the practical knowledge of midwives and South Asian pregnant women (or new mothers) with research evidence and guidelines. The strategies will support midwives to have culturally sensitive consultations about weight with South Asian pregnant women. Four workshops took place between September and November 2022 and were attended by both groups of participants. Participants were encouraged to attend all workshops. The virtual sessions were supported by two experienced facilitators (my supervisors), and myself to encourage discussion amongst all members.

Table 5.3 below provides an overview of the structure of the four workshops. The majority of these lasted for between 1.5 – 2 hours, with breaks scheduled in between. In preparation for



the workshops, participants were asked to find a picture(s) that makes them think about weight during pregnancy, since metaphor can help to externalise tacit knowledge (Nonaka and Takeuchi, 1995). The instructions for this are provided in appendix 20. They were informed that they would be asked to share the picture and why they chose it in the first workshop.

There were approximately 2 weeks between sessions 1 and 2, and 2 and 3 so as to maintain the momentum whilst allowing sufficient time to summarise sessions and manage data. Session 4 took place approximately 4 weeks after session 3 to ensure that I had adequate time to work on the prototypes.

**Table 5.3: Overview of the co-design workshops**

Session and purpose	Activities	SECI phase
<p>Session: 1 Purpose:</p> <ul style="list-style-type: none"> <li>To ensure a thorough and shared understanding of weight management during pregnancy between midwives, pregnant women, and new mothers.</li> </ul>	<ul style="list-style-type: none"> <li><b>Introduction to the workshop:</b> <b>Outline of the purpose</b> (5-10 minutes) <ul style="list-style-type: none"> <li>Why I am interested in addressing this issue.</li> <li>Introduce facilitators.</li> </ul> </li> <li><b>Clarify ground rules</b> (10 minutes) Offer core ground rules on PowerPoint slide – ask for any amendments / additions from participants (including what happens / is said in these sessions stays within the group). Explain how this workshop will be organised: <ul style="list-style-type: none"> <li>Talk through use of Teams function.</li> <li>Encourage co-designers to keep cameras on to judge how things are going, but no pressure if they do not feel comfortable with this.</li> <li>Mention use of chat bar / breakout rooms</li> <li>Emphasise that they have several ways to provide me with feedback – including sending me a private message in Teams, using the open chat bar in Teams, e-mailing me and putting their hand up to share a thought.</li> <li>Secure verbal permission to record (which will have also been specified in the information sheet and consent form).</li> </ul> </li> <li><b>Introductions.</b> I invite each person to share their name and whether they are a pregnant woman, new mother or midwife. (10 minutes)</li> <li><b>Sharing and discussion of pictures</b> (10-15 minutes) <ul style="list-style-type: none"> <li>Hold picture up to the camera and state a) why I chose it and b) what it means to me.</li> <li>Ask the co-designers to take it in turns to do the same. This will be ordered by the list of individuals on Teams.</li> <li>The facilitators will support co-designers to share their thoughts.</li> <li>Prompt questions for facilitators if more detail is needed: “What makes you say that?”, “Can you tell me a bit more about that?”, “Why is that important to you?” These will help to uncover any attitudes or beliefs in relation to weight during pregnancy.</li> </ul> </li> <li><b>Introduction to videos</b> (2 minutes) <ul style="list-style-type: none"> <li>Inform the group that I have been exploring the experiences of midwives and pregnant women through literature reviews and interviews.</li> <li>The two videos capture the stories of both groups.</li> </ul> </li> </ul>	<p><b>Externalisation</b> – The sharing and discussion of pictures will help to <i>externalise</i> practical knowledge of weight management during pregnancy.</p> <p><b>Combination</b> – Present and initiate a discussion of research evidence and guidance to ensure that this is <i>combined</i> with co-designers’ practical knowledge.</p>

Session and purpose	Activities	SECI phase
	<ul style="list-style-type: none"> <li>• <b>Sharing of videos summarising the experiences of i) pregnant women (including those who are South Asian) of weight management during pregnancy and ii) midwives when supporting women with their weight</b> (5 minutes).</li> <li>• <b>Post-video summary</b> <ul style="list-style-type: none"> <li>- Excessive gestational weight gain is linked with a range of risks to the mother and baby. There is also a greater risk of gestational diabetes amongst South Asian women.</li> </ul> </li> <li>• <b>Discussion of the videos</b> (5-10 minutes) <ul style="list-style-type: none"> <li>- Invite co-designers to discuss their thoughts of the videos and launch word clouds to invite them to share their thoughts anonymously.</li> <li>- Questions for facilitators: “Did anything come as a surprise?”, “Does this match your understanding and experience?”</li> </ul> </li> <li>• 10-minute comfort break</li> <li>• <b>Introduction to quiz</b> (2 minutes) <ul style="list-style-type: none"> <li>- Invite co-designers to join the quiz on Sli-do via their phones or another tab by typing “co-design” next to the hashtag or ask that they scan the QR code.</li> </ul> </li> <li>• <b>Sharing of quiz, correct answers and slides (15-20 minutes)</b> <ul style="list-style-type: none"> <li>- Invite co-designers to share their thoughts through discussion and word-clouds.</li> </ul> </li> <li>• <b>Summary of key points</b> (10 minutes). <ul style="list-style-type: none"> <li>- Summarise the key points raised and ask co-designers if there is anything else that should be added.</li> <li>- Inform co-designers of the purpose of workshop 2.</li> </ul> </li> <li>• After this workshop, send a thank-you e-mail to co-designers alongside bullet points that summarise what I have done with the information from this session, and what will happen at the next session.</li> </ul>	
<p>Session: 2 Purpose:</p> <ul style="list-style-type: none"> <li>• To form a shared understanding of what culturally sensitive consultations about weight with pregnant South</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Introduction to the workshop</b> (5-10 minutes) <ul style="list-style-type: none"> <li>- Brief overview of what will be discussed in this session (i.e. summary of the discussions in the previous session and forming a shared understanding of what culturally sensitive consultations about weight with pregnant South Asian women should consist of).</li> </ul> </li> <li>• <b>Summary of the discussions in previous session</b> (10 minutes) <ul style="list-style-type: none"> <li>- Briefly refer back to the quiz, and then share what I learned about the perspectives of midwives and pregnant women from the previous session.</li> <li>- Present an expanded version of the literature review and stage 1 findings from session 1. This will show the different factors that influence: 1) the experiences of midwives when providing support with</li> </ul> </li> </ul>	<p><b>Externalisation</b> – The discussion of previous experiences of weight-related consultations will help to <i>externalise</i> knowledge of how these can be improved.</p> <p><b>Combination</b> – Briefly referring back to the</p>

Session and purpose	Activities	SECI phase
<p>Asian women should consist of.</p>	<p>weight and 2) the experiences of pregnant women and new mothers when being supported with their weight. Any additional themes from workshop 1 will be highlighted.</p> <ul style="list-style-type: none"> <li>- Ask co-designers if they have any other thoughts to add.</li> <li>• <b>Introduction to discussion exercise</b> (10 minutes)</li> <li>- Present the following three questions on a PowerPoint slide and in the chat bar:               <ol style="list-style-type: none"> <li>1. <i>“What are good experiences of consultations about weight between midwives and South Asian pregnant women?”</i></li> <li>2. <i>“What are bad experiences of consultations about weight between midwives and South Asian pregnant women?”</i></li> <li>3. <i>“What can we do to improve these consultations?”</i></li> </ol> </li> <li>- These questions will help to ensure that the ideas incorporate contextual adroitness (i.e. the situational knowledge that is derived from their multiple roles and goals).</li> <li>• <b>Discussion exercise</b> (30 minutes)</li> <li>- Co-designers discuss their ideas with the support of facilitators.</li> <li>• 10-minute comfort break</li> <li>- Prompt questions for facilitators to ask: “Why should it be like that?”, “How comfortable would you feel with this?”</li> <li>• <b>Summary and overview of next session (10 minutes).</b></li> <li>- Summarise the key points discussed and ask co-designers if there is anything else to consider.</li> <li>- Confirm that the next session will involve generating ideas to support practice.</li> <li>• After this workshop, send a thank-you e-mail to co-designers alongside bullet points that summarise what I have done with the information from this session, and what will happen at the next session.</li> </ul>	<p>scientific evidence of the health risks of excessive gestational weight gain will support the <i>combination</i> of this knowledge with co-designers’ understanding of what culturally sensitive consultations about weight with pregnant South Asian women should consist of.</p>
<p>Session: 3 Purpose:</p> <ul style="list-style-type: none"> <li>• To generate ideas of prototype strategies to influence midwives to have culturally sensitive consultations about weight with South</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Introduction to the workshop</b> (10 minutes)</li> <li>- Discuss what I learned from the previous session. Refer back to the NICE guidance and scientific evidence about pregnancy-related weight gain to provide context, and then describe what the group felt were good and bad experiences of consultations about weight.</li> <li>- Present a summary the group’s agreed principles for culturally sensitive consultations about weight for pregnant South Asian women (in the form of brief statements alongside images).</li> <li>- Ask the group if they have anything else to add.</li> <li>- Brief overview of what will be discussed in this session (i.e. their ideas to support practice).</li> <li>• <b>Introduction to idea generation task</b> (10 minutes)</li> <li>- Screen-share the following question on a PowerPoint slide (and post this in the chat bar for future reference):</li> </ul>	<p><b>Externalisation –</b> Through recording and discussing their ideas of how influence midwives, co-designers will <i>externalise</i> their practical knowledge. <b>Combination –</b> The ideas of how to influence midwives will</p>

Session and purpose	Activities	SECI phase
<p>Asian pregnant women.</p>	<p><i>“How might we influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women?”</i></p> <ul style="list-style-type: none"> <li>- Emphasise that this will need to be something that will work in practice.</li> <li>- Share a diagram outlining ideas from the previous session and Stage 1 on a PowerPoint slide.</li> <li>- The agreed principles for culturally sensitive consultations will be kept in the chat bar as a reminder.</li> <li>- The group will be encouraged to share their thoughts freely and to build on the ideas of others if they wish.</li> <li>• <b>Discussion of ideas to influence midwives to have culturally sensitive consultations (15 minutes)</b></li> <li>- Co-designers will then discuss their ideas. Prompt questions for facilitators to ask: “How easy would that be for midwives to follow?”, “Can you think of any potential problems in engaging midwives with this?”</li> <li>• <b>Discussion of ideas in relation to preferences and acceptability</b></li> <li>- This is based upon a framework of acceptability (Sekhon et al., 2017).</li> <li>• 10-minute comfort break</li> <li>- Co-designers are invited to share their thoughts of each idea through discussion.</li> <li>• <b>Summary and overview of next session (10 minutes)</b></li> <li>- Summarise ideas and ask co-designers if they have anything else to add.</li> <li>- State that the next session (approximately 4 weeks later) will involve presenting prototypes of the ideas that I will have worked on. Add that I will be seeking the group’s feedback on these prototypes.</li> <li>• After this workshop, send a thank-you e-mail to co-designers alongside bullet points that summarise what I have done with the information from this session, and what will happen at the next session.</li> </ul>	<p>be a combination of co-designers’ knowledge and:</p> <ol style="list-style-type: none"> <li>1. Scientific evidence about pregnancy-related weight gain and NICE guidance (supported by referring back to this at the start of the session).</li> <li>2. Guidance in relation to measuring acceptability (Sekhon et al., 2017).</li> </ol> <p>This combined knowledge will be represented in the prototypes that I then work on.</p>
<p>Session: 4 Purpose:</p> <ul style="list-style-type: none"> <li>• To gather feedback from co-designers in relation to the prototypes of their ideas.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Introduction to the workshop (10 minutes)</b></li> <li>- Share what I learned from the group’s ideas of how to influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women.</li> <li>- Inform co-designers that I have been working on some prototypes of their ideas. Add that this session will involve seeking feedback on the prototypes and reflecting on the previous three sessions.</li> <li>• <b>Presentation of prototypes (15 minutes)</b></li> <li>- When presenting each prototype, link it back to the ideas derived from the previous session. Hold it up to the camera and screen-share a copy of it. Describe its main features and then ask: “Is this what you had in mind?” after each prototype is presented.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Externalisation –</b> Present the prototypes and seek feedback on these to <i>externalise</i> co-designers’ practical understanding of what will work in practice.</li> </ul>

Session and purpose	Activities	SECI phase
	<ul style="list-style-type: none"> <li>- After all of the prototypes are presented, ask the following questions: “What would work in practice?”, “What do you think is worth trying from these ideas?” This will help to determine how contextually adroit the prototypes are.</li> <li>• <b>Feedback on prototypes</b> (20 minutes)</li> <li>- Co-designers share their thoughts on what would work in practice and which idea is worth developing further.</li> <li>- Then confirm which idea(s) have been selected for development with the designer.</li> <li>• <b>Summary of the previous three sessions and personal takeaways</b> (15 minutes)</li> <li>- Provide a PowerPoint presentation (with one image per slide) in which I summarise what has been discussed in the previous three sessions. This will include the following:               <ol style="list-style-type: none"> <li>1. The conflict between scientific evidence for the risks of excessive weight gain in pregnancy and the qualitative evidence surrounding the experiences of midwives and pregnant women in managing this.</li> <li>2. What I have learned from the activities over the last three sessions – namely the picture-sharing task, discussion of good and bad experiences of consultations about weight and ideas of how these can be improved. Emphasise that what has been learned will now be moved into practice via the chosen prototype strategies.</li> </ol> </li> <li>- Thank the co-designers for their time and ask the group if they have any further thoughts to add. Ask: “What are you taking away from this experience?”</li> <li>• <b>Overview of next phase of the study</b> (5 minutes)</li> <li>- Briefly describe the next phase of the study (i.e. using the feedback to develop the prototypes further and seeking feedback from midwives).</li> <li>• After this workshop, send a thank-you e-mail to co-designers alongside bullet points that summarise what I have done with the information from this session, and what will happen in the next phase of the study. Share a link to an anonymous feedback survey on Microsoft Forms (appendix 21) and ask participants to complete this within the next two weeks.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Combination</b> – <i>Combine</i> the knowledge within the prototypes with the feedback to support the development of the prototypes after this session.</li> </ul>

The co-design workshops were recorded in Microsoft Teams. In addition, the following data were collected to capture collective sensemaking and the manner in which different types of evidence were appraised:

- Conversations stored in Microsoft Teams (which summarised the thoughts of the group).
- Thoughts captured in word clouds.
- Discussion of ideas in relation to preferences and acceptability based upon a framework of acceptability (Sekhon et al., 2017).
- Feedback in relation to individual experiences of the co-design sessions (appendix 21).

The purpose of the feedback survey (appendix 21) was to support a reflection of the process and the experiences of the co-designers. After each session, a meeting took place between myself and the facilitators to consider progress against objectives, and how equal the participation in discussions was. It was agreed that all co-designers contributed sufficiently to the discussion. As such, no adjustments were required.

#### **5.4.5 Data analysis**

Overall, a deductive approach to analysis was adopted, in which areas of synergy and dissonance in co-designers' views were mapped against the mindline sources within the framework created from the interview data. Information was also synthesised in between workshops to ensure that the purpose of each session (table 5.3) was achieved. Table 5.4 below provides a summary of this for the interim analysis. This involved an iterative process in which information from one workshop was extracted and then shared in the following workshop for further comments from co-designers.

**Table 5.4: Summary of information synthesised in between workshops**

Workshop	Question		Session purpose
Workshop 1	What does weight during pregnancy make us think of?		To ensure a thorough and shared understanding of weight management during pregnancy between midwives, pregnant women, and new mothers. This provided an insight into how GWG mindlines had developed.
	Additional thoughts following sharing of videos summarising experiences - including areas of agreement and disagreement		
	Additional thoughts in relation to quiz		
Workshop 2	What are good experiences of consultations about weight between midwives and South Asian pregnant women?	Midwives' views	To form a shared understanding of what culturally sensitive consultations about weight with pregnant South Asian women should consist of.
		Pregnant women and new mothers' views	
	What are bad experiences of consultations about weight between midwives and South Asian pregnant women?	Midwives' views	
		Pregnant women and new mothers' views	
	What can we do to improve these consultations?	Midwives' views	
		Pregnant women and new mothers' views	
Workshop 3	Ideas - "how might we influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women?"		To generate ideas of prototype strategies to influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women. This highlighted how mindlines could be enhanced.
Workshop 4	Feedback on prototypes		To gather feedback from co-designers in relation to the prototypes of their ideas.
	Additional thoughts following summary of the last three workshops		
	Personal takeaways - what are you taking away from this experience (to check the level of involvement and ensure reciprocity as part of the NIHR principles of co-production (Hickey et al., 2021)).		



The quantitative data from feedback surveys was summarised through the use of descriptive statistics using Microsoft Excel. Any qualitative data within the surveys was analysed through Framework Analysis to support the process evaluation of the extent to which NIHR principles of co-production (Hickey et al., 2021) were realised.

#### **5.4.6 How the findings were synthesised to inform Stage 3**

As discussed previously, tables were produced for: i) midwives and ii) South Asian pregnant women/new mothers highlighting mindline-based challenges and corresponding solutions in relation to GWG. These were derived from Stages 1 and 2, and informed the content of the prototype strategies that would be tested in Stage 3.

### **5.5 Stage 3 – Prototype feasibility testing**

**Aim:** To develop and test the prototypes of strategies to ensure that the combined knowledge was transformed and could be *internalised* and used by midwives in Birmingham. This was underpinned by the following sub-objectives:

- i. To develop and refine a series of prototypes. Some examples of prototypes include models of an animated video, podcast, infographic, or workbook.
- ii. To use interviews and/or a focus group with midwives to evaluate the acceptability of the prototypes (Sekhon et al., 2017).

#### **5.5.1 Design**

The mindline-based challenges and corresponding solutions from Stages 1 and 2 directly contributed to the content of the prototypes designed. This helped to “transform” the combined knowledge from Stage 2. Subsequently, focus groups and/or interviews were conducted to test whether this knowledge could then be *internalised* and used by midwives in Birmingham. The schedules were developed to elicit an understanding of how “contextually adroit” (Gabbay and le May, 2011: 90) the prototype strategies were and the extent to which the knowledge had been internalised. That is, whether they drew upon the context-specific knowledge of midwives and could be used in practice (appendix 22). This was achieved through the use of questions that underpinned constructs of the acceptability framework (Sekhon et al., 2017), such as how participants imagined the strategies being used (to determine intervention coherence) and whether they would give them to women/colleagues (to assess fidelity).

### **5.5.2 Participants**

#### *Inclusion criteria*

The following group was invited to take part in interviews or focus groups between May-July 2023:

- Midwives and/or third-year student midwives in England (n=up to 20).

#### *Exclusion criteria*

The exclusion criteria were as follows:

- Midwives or third-year midwifery students who are not from England.
- Student midwives who are not in their third year.

Midwives and/or final-year student midwives across England were recruited to help determine the acceptability of the strategies. This is an important preliminary step before the influence on practice can be determined. A sample of up to 20 was deemed acceptable in achieving data sufficiency (Young and Casey, 2019).

### **5.5.3 Recruitment**

A convenience sample of midwives were approached from Birmingham City University. In addition, word-of-mouth was used, whereby colleagues were asked to share details of the study with midwives that they know. Individuals who expressed an interest in the study were provided with a participant information sheet (appendix 23). This informed them that they had the option to take part in either an interview or focus group discussion, which could either be online or in person. This provided my e-mail address and telephone number should they wish to ask any questions or express interest in participating. Individuals who were interested in participating after receiving an information sheet were provided with a consent form (appendix 24).

### **5.5.4 Data collection**

Participants were provided with the option to take part in a face-to-face interview or focus group discussion, that could either be in person or via Microsoft Teams. The following types of data were collected:

- Demographic detail forms (appendix 10) (which did not capture names but were linked with unique study identifiers). The purpose of these was to provide a descriptive summary of the findings.
- Recording and transcription of the interviews and/or focus group discussion. These lasted for a maximum of one hour.

### **5.5.5 Data analysis**

The demographic data was summarised through the use of descriptive statistics. This supported a descriptive summary of midwives who provided feedback on the prototypes. For instance, it was envisaged that there may be differences in perspectives depending upon the level of experience in midwifery (Laisser et al., 2021). The interpretation of the interviews and/or focus group discussion was supported by the use of framework analysis (Ritchie and Spencer, 2002).

## **5.6 Rigour**

The consolidated criteria for reporting qualitative research (COREQ) checklist (Tong et al., 2007) guided the reporting of all aspects of the study. In addition, I maintained reflexivity by keeping a diary of how my experiences and positionality influenced my interpretations, which is an important aspect of ensuring rigour (Berger, 2013). For instance, it has been recommended that researchers reflect upon their assumptions and question these when interpreting data (Braun and Clarke, 2019). I also ensured credibility of the findings through i) providing detailed descriptions of participants' accounts (Geertz, 1973), and ii) keeping a decision trail to ensure that interpretations are transparent and consistent. The latter was informed by several techniques - including checking the meaning of outliers, considering competing explanations and looking for cases that disconfirm a conclusion (Miles et al., 2014).

The use of triangulation (in which themes in Stage 1 are verified and expanded upon in Stage 2), also contributed towards the dependability of the findings. Furthermore, I provided a sufficient level of detail in my description of the samples, settings, and procedures to allow readers to assess the potential transferability to their own settings. Additionally, I shared my analyses with my supervisors to enhance the confirmability of the findings (i.e. confidence that the results have been confirmed by other researchers). This also allowed me to cross-check that the conclusions flow from the analysis of the data.

## **5.7 Ethical considerations**

Ethical approval was received from the Faculty Academic Ethics Committee and NHS Research Ethics Committee – the latter of which involved a submission on the Integrated Research Application System (IRAS). A copy of the faculty approval letter is provided in appendix 25. The favourable opinion letter and Health Research Authority (HRA) approval letter are included in appendix 26 and 27 respectively. The section below provides a summary of how ethical principles for the protection of human participants of research (The

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) were adhered to:

- *Respect for persons* – The autonomy of participants was respected through providing them with sufficient information about the study and ensuring that informed consent was provided before they participated. The information sheets explicitly informed participants that they could stop taking part in the study at any time, but that any data contributed up until that point would be retained.
- *Beneficence* – Efforts were made to i) ensure that all co-designers felt that their voices were heard and ii) to secure the wellbeing of participants. For example, the content of workshops was kept clear, simple, and limited in length. Participants also had the flexibility to switch their camera on or off. In Stages 1 and 2, South Asian pregnant women and/or new mothers had the option to bring a friend or relative to interpret. I also provided sufficient information about what to expect in advance and was supported by two experienced facilitators.
- *Justice* – There is a paucity of specific maternity interventions in the UK for women from an ethnic minority background (Garcia et al., 2015). Additionally, the selection of South Asian women was underpinned by evidence that they comprised a significant proportion (634 per 1,000) of women with a recorded BMI who were categorised as overweight or obese at the antenatal booking appointment in 2018 (NHS Digital, 2019a). The research therefore aligned with the principle of justice.
- *Safeguarding* – I strived to create a safe space for all participants to share their perspectives by emphasising that I would like to “walk in their shoes” to understand their experiences. It was anticipated that if undesirable practice was disclosed, I would assess the situation carefully and if necessary, inform a safeguarding officer. In the event that harmful practice was disclosed, I planned to assess the situation and consider all possibilities before informing a safeguarding officer or the individual’s line manager (depending on the situation). If a safeguarding issue were to be disclosed, I planned to listen carefully, record as much information as possible and clarify my duty to report this on to a safeguarding officer (Birmingham City University, 2017). I was also considerate of the need to ensure immediate protection of the individual by speaking to a Safeguarding Lead at the University and making a referral through the University’s Report and Support system if necessary. The safeguarding lead would then conduct a risk assessment and if required, escalate the concern to the police, social services, or the University’s Security department. I also informed participants of my responsibility to disclose any harmful behaviour or

intentions in the information sheets. I ensured appropriate safeguarding of the participants through close monitoring of each stage and planned to signpost them to relevant contacts such as their maternity service, health visitor, GP or Patient Advice and Liaison Service (PALS) – depending upon the situation.

Confidentiality was also carefully considered through the use of security measures (namely the use of study identifiers, not including any identifiable information in transcripts and saving data on the encrypted OneDrive). There was a small risk that participants in the co-design workshops and focus group would disclose shared information to others outside the group. However, efforts were made to prevent this by requesting that all shared information is not disclosed beyond the group at the beginning.

In addition to procedural requirements, ethical issues were also considered as part of ongoing practice through a reflexive approach (Guillemin and Gillam, 2004). This involved reflecting upon my influence on the research and interactions with participants. For instance, it was important to consider the ordering of questions, how they were framed and the potential impact of these on participants. I also reflected upon my learning from my supervisors when they shared their knowledge and experience of co-design to support the planning of the workshops. Their insights included the importance of being considerate and engaging people throughout, since sitting and listening can be onerous. They advised sending thank-you e-mails in between workshops to keep co-designers in the loop with what is happening and enhancing confidence that feedback will be taken forward.

## Chapter 6 Results

### 6.1 Introduction

This chapter provides a detailed exploration of the findings across the three research stages – namely the qualitative interviews, co-design workshops, and prototype feasibility testing. The analysis of the interviews will help to understand how lay and professional GWG mindlines developed during socialisation and interacted with one other. Additionally, the externalised knowledge of midwives and pregnant women will be explored. The summary of the co-design workshops will examine how the externalised practical understanding of co-designers was combined with research evidence and guidelines within the prototype strategies. Finally, the overview of the feasibility testing will assess the acceptability of the strategies and the extent to which the combined knowledge could be transformed, internalised, and used by midwives. Furthermore, an overview will be provided of how data from each of these stages fits together.

### 6.2 Stage 1 – Qualitative interviews

The purpose of the interviews was to explore how lay and professional GWG mindlines developed during *socialisation* and currently interact with each other, and to *externalise* knowledge by asking for specific examples and stories. This would reveal experiences of weight management during pregnancy or the support of this, thereby helping to ensure a shared understanding between the two groups for the subsequent research stage. To reiterate, socialisation involves sharing tacit knowledge (e.g. technical skills, beliefs) between individuals, which becomes explicit during externalisation (Nonaka and Takeuchi, 1995). A demographic overview of the two samples will initially be provided. This will be followed by an overview of participants' experiences using Framework Analysis (Ritchie and Spencer, 2002), and an overarching synthesis of how the two groups' GWG mindlines developed.

#### 6.2.1 Description of participants

Twenty virtual interviews were conducted with women between August 2020 and September 2022. Eighteen were pregnant and two were recently pregnant. The latter were pregnant at the time of expressing interest in the study but were interviewed post-delivery or following miscarriage following their request for a more convenient time. The duration of these ranged from 8 minutes and 43 seconds to 36 minutes and 24 seconds (median = 18 minutes and 21 seconds). A demographic details form was completed by eighteen of the interviewed women (90%), and they were predominantly aged 18-30 (n=12; 67%). Although the majority of

women were from the South East of England or London (n=4), they were from a broad range of ethnic categories. This was due to the challenges of recruiting women from South Asian backgrounds. However, a wide scope of ethnicities helped to clarify specific differences amongst women from South Asian backgrounds. Five pregnant women were South Asian – two of whom responded to an advertisement targeting South Asian women but did not report their specific background.

Nine midwives participated in virtual interviews between November 2020 and August 2022. These ranged between 13 minutes and 10 seconds to 1 hour and six minutes (median = 18 minutes and 47 seconds). Eight of the interviewed midwives completed a demographic details form (80%). Where level of experience in midwifery was reported, all participants had over five years of experience. Midwives were largely based in hospital Trusts within the West Midlands (n=5), and from predominantly White British backgrounds (n=5; 63%). As such, a maximum variation sample was more closely attained with pregnant women than midwives. All interviews (n=20 pregnant women and n=9 midwives) took place through Microsoft Teams. Table 6.1 provides a demographic overview of participants.

**Table 6.1: Demographic summary of participants<sup>2</sup>**

Participant number	Participant category	Ethnic category	Region (residence for pregnant women and Trust for midwives)	Age category of pregnant women	Level of experience amongst midwives	Setting of midwives
P1	Pregnant woman	White	South West	18-30		
P3	Pregnant woman	White Other	South East	18-30		
P2	Pregnant woman	Black African	East	31-40		
P4	Pregnant woman	White British	South East	18-30		
P5	Pregnant woman	Black British	London	18-30		
P6	Pregnant woman	Black	East Midlands	18-30		
P7	Pregnant woman	Black	South East	18-30		
P8	Pregnant woman	Black	West Midlands	18-30		
P9	Pregnant woman	White British	South East	18-30		
P10	Pregnant woman	Mixed - White European and Brazil	London	31-40		
P11	Pregnant woman	British Indian	West Midlands	18-30		
P12	Pregnant woman	Pakistani	North West	18-30		
P13	Pregnant woman	Black	London	18-30		
P14	Pregnant woman	White British	Yorkshire and The Humber	31-40		
P15	Pregnant woman	White Scottish	London	31-40		
P16	Pregnant woman	White British	South West	19-30		
P17	Pregnant woman	White British	West Midlands	31-40		
P18	Recently pregnant woman	Pakistani	East	41-50		
P19	Recently pregnant woman	South Asian* (responded to specific recruitment)	*	*		

<sup>2</sup> Fields for which no data were provided are marked with an asterix. P refers to pregnant women and M refers to midwives



Participant number	Participant category	Ethnic category	Region (residence for pregnant women and Trust for midwives)	Age category of pregnant women	Level of experience amongst midwives	Setting of midwives
		strategy targeting South Asian women but did not disclose specific ethnic background)				
P20	Pregnant woman	South Asian* (responded to specific recruitment strategy targeting South Asian women but did not disclose specific ethnic background)	*	*		
M1	Midwife	White British	West Midlands		*	*
M2	Midwife	White British	West Midlands		*	*
M3	Midwife	White British	West Midlands		*	*
M4	Midwife	White British	East Midlands		*	*
M5	Midwife	White, Other	London		*	*
M6	Midwife	White British	East Midlands		5-10 years	Midwife-led alongside unit
M7	Midwife	Black British	West Midlands		Over 10 years	All areas of Midwifery
M8	Midwife	Arab	West Midlands		Over 10 years	*
M9	Midwife	*	West Midlands		*	*

### **A reflexive account of the interview process**

As a novice in interviewing, I found that my skills developed throughout the course of the study. For instance, I noted that my first three interviews required further probing with additional questions to yield rich findings related to the influences on women and midwives' mindlines. This meant that further flexibility in my approach to the interviews was needed. In addition, it appeared that the depth of responses varied considerably across participants, with some needing less probing than others due to the comprehensive examples that they provided. As the interviews progressed, I made a more conscious effort to engage in active listening through summarising responses and providing non-verbal signals such as facial expressions to indicate interest and maintaining eye contact (Anderson and Henry, 2020; Lavee and Itzhakov, 2021).

At the time of the interviews, participants were not questioned in relation to sleep or emotional health (although a few pregnant women did share examples of the influence of emotional wellbeing on their diet or physical activity). Towards the end of the interviews, I became mindful of the need to avoid a "calories-in-calories-out" approach through more extensive reading. It occurred to me that this was an important aspect of the knowledge that needed to be mobilised as part of the final strategies. Perhaps, I reflected, some of the stigma surrounding discussions of GWG stemmed from implicit assumptions that over-emphasised individual responsibility and role of diet and physical activity. It occurred to me that explicit knowledge, (i.e. research evidence surrounding the importance of sleep and emotional health) may help to transform feelings of stigma into compassion, thereby reshaping tacit understanding. Inevitably, then, my thinking and the subsequent focus of the study evolved towards the end of the interviews and beyond. The lifestyle behaviours described in the Stage 1 findings will therefore be limited to diet and exercise.

### **6.2.2 Midwives' GWG mindlines**

Midwives' mindlines were influenced by the following themes: i) information and guidance, ii) perceived support and engagement from women, iii) lack of time and resources, iv) conflicting perceptions of obesity, v) empathy for women, and vi) personal strategies. Each of these will be discussed below.

#### *Information and guidance*

Some midwives voiced a need for further clarity in national guidance for health professionals when supporting weight management during pregnancy (such as NICE (2010)): *"I think it's very scatty and confused isn't it? I mean I don't think there's an awful lot of work been done on it to be fair"* (M4). Midwives also expressed a desire for further clarity on how much weight women should gain. Some examples include: *"Yeah, I don't think we know what is acceptable weight gain. I don't know what would be the acceptable weight to be pre-pregnancy."* (M4) and: *"(W)hat is normal weight gain? I think that would be really helpful to*

*establish. But in a way that didn't kind of make women feel that, erm, they were being excessively monitored.” (M6). This sense of uncertainty in relation to how to monitor weight created feelings of unease within midwives’ GWG mindlines. As such, the need for guidance to support the practice of midwives was amplified. This was reinforced when other midwives described a need for further emphasis on GWG in training, and how they can support women:*

*“Erm, so yeah, there is very little. I haven't seen any leaflets or anything...I think if, if someone has a high BMI, we'll say to them “Oh well you're gonna be like on a high-risk pathway, you can't go to the birth centre. You can't have a water birth.” So, we tell them what they **can't** do. But we don't talk about how they can change it or what they **can** do.” (M9)*

This midwife reported a punitive approach to supporting women with their weight. Through repetition of the word “can’t”, her need for a more proactive strategy for supporting women with their weight is accentuated. Other midwives revealed a preference for other colleagues to be aware of the technical rationale behind weight monitoring. The following passages illustrate midwives’ concerns: *“You know, if they can't go in depth into why the anatomy and physiology and what it increases the risk of, then it's ... And we're very much in a culture these days where women don't trust us as much.” (M3) and: “But it's having that knowledge out there, giving the rationale, giving the **rationale** as to why we talk about weight gain...” (M7). The emphatic tone of these extracts highlights the need for credibility within midwives’ guidance so as to facilitate women’s engagement in discussions about weight. Therefore, midwives’ GWG mindlines were underpinned by their trust in scientific evidence for the risks of excessive GWG.*

Some midwives described a need for more tailored food guidance to support women from ethnic minority backgrounds, including those who are South Asian. One example of this revealed: *“Erm, there's nothing there that tells us about...healthy eating, healthy lifestyle from a perspective, of, a, minority ethnic women. It's **still** your potatoes (laughs), your dry rice.” (M8). This extract indicates feelings of frustration with the lack of culturally appropriate guidance to inform discussions about healthy eating. Despite this, others shared that their knowledge of how to support women was fostered by experiential understandings acquired from practice. These included the capacity to consult multiple resources such as newspapers, colleagues, and dieticians to support their provision of dietary advice. One example of this is highlighted below:*

*“(A)s regards saying “ooh you should be eating x amount of, you know, er, green veg and so much fish” it’s literally just probably what I would consider healthy from, from discussion with other midwives, and... you know, about Slimming Clubs and, and, things I’ve read in the newspaper...” (M2)*

This description reveals valuable experiential knowledge concerning the importance of practical judgement in supporting this midwife’s mindlines and consultations with women. Moreover, multiple sources of information were adeptly synthesised with this judgement. Thus practice-based knowledge was sometimes a constructive component of midwives’ mindlines when supporting them to advise women.

In summary, midwives encountered challenges and facilitators in relation to the information and guidance that they encountered. Their reports of a lack of sufficient guidance on weight gain and how to support women contributed to feelings of uncertainty, whilst the value of credible guidance and wider resources (such as other colleagues) had the potential to enhance midwives’ mindlines.

#### *Perceived engagement from women*

Midwives experienced diverse levels of engagement from women when initiating discussions about weight. Moreover, such experiences were dominant sources of influence on midwives’ GWG mindlines. Several midwives described a reluctance to discuss weight amongst a minority of non-South Asian women. This contributed towards their perceived sensitivity of the topic. Midwives’ reports indicated some instances in which women did not consider their weight gain to be a problem: *“(S)ometimes they’re not apologetic about that, and don’t care...” (M2)* and: *“When we were talking about it (weight)[.....] she felt so overwhelmed that she got very angry and just stood up and walked off and left her partner there.” (M5)*. The participant in the second extract provided a clear image of the woman’s reaction to her guidance, which reflects the potential irritation.

In addition, a minority of midwives expressed frustration with some women’s health behaviours related to physical activity and nutrition. For instance, when one midwife was asked about her experiences of supporting South Asian women, the following account was shared: *“I don’t like to generalise because I do like to look at women on an individual basis, but I do the, sometimes if they do have a large BMI and gestational diabetes, they’re not great at monitoring their blood sugars.” (M9)*. This participant later clarified that dietary behaviours were being referred to. Additionally, her account reveals a sense of conflict between professional values of the importance of individualised care, and experiential

evidence acquired from practice. This suggests that in some instances, midwives' mindlines embodied a tension between different forms of knowledge in relation to GWG.

However, other midwives described receptivity when initiating discussions of weight gain with women (including those who are South Asian). This was evidenced in reports of openness and positive lifestyle changes: *"They **know** they're overweight and a lot of them do say "Oh we've, we've been trying to lose weight"...and that's from any ethnicity..."* (M7). This emphasises the encouragement that participants derived from women's receptivity. Consequently, some midwives' GWG mindlines were altered, enhanced, and channelled towards decisions to continue advising women as a result of their positive experiences of consultations in relation to weight gain.

The findings above indicate considerable diversity in midwives' perceived engagement from women. On the one hand, they described feelings of frustration with some lack of engagement and current lifestyle behaviours. On the other, they derived encouragement and reassurance from other women's openness and positive lifestyle changes. Therefore, the development of midwives' GWG mindlines was often contingent upon recent experiences of perceived engagement within the midwife-woman relationship.

#### *Lack of time and resources*

This theme revealed the dominance of midwives' organisational context on how midwives' mindlines were constructed during socialisation. Specific challenges included: i) insufficient time in appointments, ii) a lack of routine weight monitoring, and iii) a need for resources to support individualised care. Several midwives expressed concerns about their perceived lack of time to discuss weight. One example of this was provided when a midwife reflected upon appointments with South Asian women: *"But in community, in the antenatal period, there's so little time to talk about things and there's so many different things that we do need to talk about, especially, erm in this demographic where, erm there's risk factors other than weight."* (M9). This participant emphasised the perceived contrast between the transience of appointments and the breadth of topics that need to be discussed. Consequently, her sense of frustration with needing to compromise is revealed, which underlines the capacity of this belief to shape some midwives' GWG mindlines and result in less readiness to discuss weight.

In addition, some midwives' reports indicated experiences of being hindered by organisational policies that did not require women to be weighed after the booking appointment. As such, excessive GWG was frequently undetected. An example of this is provided below: *"So **actually** what I think we **don't** do, say a woman books out with a BMI of*

*29, and then, half-way through pregnancy, she has a BMI of 33, we don't pick those women up. Not in our institution, definitely not.*" (M4). Here there is a sense of tension between the current policy on weight monitoring and the participant's perspectives of an ideal pathway. In particular contexts, then, midwives' GWG mindlines developed in direct response to the perceived feasibility of guidelines. Furthermore, professional values of how women should be monitored contributed to the evolution of midwives' mindlines.

Some midwives expressed a need for further resources to provide women with individualised care. These requests were voiced in general and specific terms related to food guidance for South Asian women. The following accounts provide examples of midwives' need for further resources: *"One could argue, have we **really** got the resources, the finance, the staff, **all** of the things to really truly give individualised, customised care?"* (M4) and: *"I do also **feel** that erm, a lot of the examples that are given as to what food you should be eating and so forth, is mainly erm, for **European**."* (M7). These extracts reveal midwives' frustration with their lack of resources to support the provision of care that is individually and culturally tailored. This emphasises their professional values regarding the importance of this. As a result, some midwives experienced dissonance within their existing GWG mindlines. Here, there was a conflict between professional values and available resources to support mindline informed consultations. In summary, midwives experienced organisational barriers to effectively advising and supporting women with their weight. This suggests that their secondary socialisation generated norms that influenced their mindlines and constrained subsequent practice.

#### *Conflicting perceptions of obesity*

Specific challenges regarding this theme were emphasised in accounts of the perceived sensitivity of weight, or, paradoxically, the increasing normalisation of obesity in society. Midwives related the sensitivity of weight to: i) their own weight status, ii) the societal stigmatisation of obesity and iii) a desire to safeguard relationships with women. Some midwives reflected upon their own weight or that of other colleagues and regarded having a low or high BMI as equally problematic: *"(L)ots of midwives don't wanna talk about weight,...]if they like have have obesity then you know they don't wanna talk about obesity with women who also have obesity."* (M6). Thus, despite having developed earlier in socialisation, midwives' body image evidently shaped the evolution of their GWG mindlines. This extract highlights the pivotal influence of this understanding on their mindlines and consequent comfort in providing women with guidance on weight. This alludes to midwifery GWG mindlines that were less responsive to enhancement when body image was an area of concern.

Some midwives shared perspectives regarding the societal stigmatisation of obesity, which highlighted their empathy for women's challenges. The following example provides an insight into this: *"Nobody wants to send me to a psychiatrist to see why I over-eat, but they'd love to send anybody to a psychiatrist that they might...suspect under-eats. Society doesn't like fat people."* (M4). This sense of oppression suggests that for some, midwives' GWG mindlines internalised some of the social influences that women were exposed to. Consequently, perceptions of stigma lingered in midwifery mindlines. In addition, some midwives described a need to maintain an amicable relationship with women and regarded discussions about weight as a threat to this: *"(Y)ou're sort of already sort of saying to them: 'I think you know, you've got this problem' and...I think it just creates a bit of a barrier. Erm, to bond,..."* (M2). This participant's concerns revealed personal and professional values in relation to the importance of building a sense of companionship with women. These conflicted with the very prospect of offending women, which suggests that discussions about weight were deemed as confrontational. Thus, in some instances, midwives' GWG mindlines had become ingrained, and contributed to anxieties about advising women.

Some midwives also shared concerns regarding normalised attitudes towards obesity amongst women and at a societal level. Moreover, one midwife reported fears that obesity amongst health professionals could be a potential barrier to advising and supporting women with their weight: *"It feels that there (needs) a big culture shift, from within health professionals saying 'okay, I am the one that needs to help you out, but I need to acknowledge that I need help as well'."* (M5). This participant alluded to a societal pervasiveness of obesity that is now reflected amongst health professionals. This magnified concerns regarding the increasing normalisation of obesity, and the perceived barrier that this may exert in effectively advising women about weight. To summarise, the sensitivity and normalisation of weight gain were important facets of midwives' mindlines, which exacerbated their feelings of discomfort in advising women. Consequently, the development of midwives' GWG mindlines was mediated by diverse forms of tacit knowledge, which ranged from personal understandings related to body image to broader perspectives about the societal discourse of weight.

### *Empathy for women*

Midwives often expressed considerable empathy for women when reflecting upon the social and environmental factors that influenced their health behaviours. Moreover, they stressed a need to protect the health of women and their babies. Empathy frequently had a bolstering effect on midwifery mindlines and stirred the desire to provide women with individualised support (discussed in the section on personal strategies below). However, this also

contributed to broader concerns with the societal stigmatisation of obesity (discussed in midwives' conflicting perceptions of obesity above). Consequently, empathy had a strong influence on midwives' decision-making in relation to GWG. To illustrate, some contextual knowledge was shared in relation to South Asian women's social and environmental backgrounds, which included an understanding of the challenges of living in large households and buying food without traffic light labelling in some South Asian stores (below): *"Most of them tend to live in bigger households. And as well they tend to cook a certain way. And they cook for...a huge amount of people most of the time."* (M5). Another midwife explained: *"But from where I shop um in some of the Asian shops and so forth, we don't have that system...So with that, you, ...could well be thinking that...you're doing really well. (Laughs)."* (M7). These descriptions convey midwives' awareness of the contextual factors that influenced South Asian women's GWG mindlines. This suggests that some midwives' mindlines had adapted in light of their experiential understanding of South Asian women's challenges. This awareness served to enhance midwives' ever-evolving GWG mindlines.

Another example of midwives' empathy was conveyed when a minority shared an understanding of how the food environment could adversely influence women's lifestyle choices: *"You know it's just er, and it's so easy now, and so **cheap** I think really, in comparison, you know, I think back to...er, when takeaways were a real luxury,..."* (M2). This midwife juxtaposed previous and current observations of fast-food consumption, which emphasised her empathy for women. Takeaways were described with a sense of ease and accessibility, which indicates a feeling of inevitability that some women's dietary intake would be hindered by this. Many midwives' reports also revealed protective values prioritising the woman's health and that of the baby: *"And I **do** think it's [supporting women with their weight] important. Sorry, I do think it's important. Because we **know** we **know** that stillbirth, massive spectral haemorrhage are linked to BMI, raised BMI."* (M8). This midwife explicitly linked the importance of effective support with weight management with the risks of an elevated BMI. Therefore, the need to safeguard women swayed midwives' mindlines, and triggered their motivation to support them with their weight.

In summary, empathy provided valuable emotional awareness within midwives' mindlines and facilitated a nuanced understanding of women and the guidance that they required. Furthermore, midwives' empathy had a nurturing influence on the development and flexibility of their GWG mindlines. To reiterate, empathy stemmed from protective values and midwives' observations of the social and environmental factors that influenced women's GWG mindlines. In some instances, empathy contributed to midwives' observations of stigma within their conflicting perceptions of obesity. In others, it enabled individualised



support. As such, empathy fuelled divergent pathways of influence on midwives' GWG mindlines and clinical practice.

### *Personal strategies*

Some midwives shared personal strategies that helped them to advise women about weight management. These were described particularly intuitively and included: i) an individualised approach to discussions and ii) combining discussions with other tasks to address time constraints. As such, their reports demonstrated vital experiential knowledge and technical know-how: *"Erm, and also you need to know the woman. So it's helpful to know whether this is something of interest to her anyway, ... Because the last thing you wanna do is ... trigger like any kind of like traumatic response."* (M6). This extract conveys empathy towards women's personal challenges with weight. Furthermore, this midwife's approach was guided by personal and professional values endorsing compassionate care for women. This suggests that midwives had valuable practical, experiential knowledge of consultations, which served to cultivate their GWG mindlines.

One midwife shared that her ability to navigate time pressures when supporting women developed through experience. She revealed an effective time management strategy that she now used when managing her workload to ensure that conversations about weight were prioritised: *"(Y)ou can still have those sort of informative...chats...while you're doing other things on the...on the couch or while you're checking their blood pressure or things like that."* (M5). This description illustrates important technical know-how that fostered the development of this midwife's mindlines. Consequently, her unique mindline shifted how she supported women in practice and consolidated her confidence in completing clinical tasks and weight-related discussions in parallel.

In summary, some midwives were able to capitalise on personal strategies to support their consultations with women. The accounts of an individualised approach and synthesis of discussions with other tasks reflected midwives' empathy and technical know-how. These reveal the influence of personal and professional values and experiential learning in supporting midwives' GWG mindlines. Thus, some midwives' mindlines evolved through multifaceted forms of knowledge acquired from their socialisation within clinical practice. The interviews therefore provided midwives with an opportunity to externalise their mindlines and helped to uncover how these had developed during socialisation.

### 6.2.3 Women's GWG mindlines

Women's mindlines were influenced by the following: i) information and guidance, ii) perceived support from midwives, iii) social influences, iv) environmental factors, v) physiological changes, and vi) protective values to safeguard their health and that of the baby. The section below provides an overview of the influence of these understandings, and where relevant, their interaction with other factors.

#### *Information and guidance*

Many women (including those who are South Asian) expressed a need for further guidance on how much weight to gain during pregnancy: *"Erm, probably the required amount of weight that one should gain. That is the knowledge that should be availed to people... So that they can be knowing the, the required weight that they should be weighing at the time like they are getting due for the baby."* (P6). Another woman explained: *"Yeah, definitely around that kind of baseline. And I think, so at the beginning of the pregnancy actually, erm I **lost** around three and a half, four kilos... But then there's no kind of, I remember there was no information around... whether that's OK..."* (P11). These extracts emphasise frustration with the lack of formal guidance in relation to weight gain during pregnancy. This was connected with their need for a benchmark to guide their health behaviours.

In addition, several women voiced a need for trusted sources of information to facilitate their understanding and decisions related to lifestyle. One example of this revealed: *"And... sometimes I Google stuff, but I make sure it's a **proper** website... I make sure it's NHS approved or something."* (P15). Moreover, the need for trusted guidance was particularly strong for all South Asian women: *"But I think, uh, the midwives' advice counts the **most** obviously because they are, they are the professional ones, and they, they tell you about all your confusion and things. So, their advice matters the most."* (P12). Another woman explained: *"For getting advice from different professionals, they know more experience."* (P18). In both instances, women revealed a tension between family advice and the guidance of health professionals. Therefore, South Asian women's GWG mindlines often evolved from a resolution of competing sources of information.

Furthermore, some South Asian women reported a need for closer guidance to support weight management in the first pregnancy: *"(T)here were so many things actually, that what, what kind of things I should eat. What I can do, what I should **not** do ... in your first pregnancy you should, you should get like proper support."* (P12). Another woman stated: *"Like you know, if it's your first pregnancy of what you should or should not be eating. Erm, you know, so it's, erm I think something like that would be quite useful."* (P20). The words

“should” and “should not” emphasise women’s perceived responsibility to safeguard the health of their babies, which underpinned their views of the information that they received. Thus, women’s sense of maternal duty had a powerful influence on their GWG mindlines and prompted a need for greater clarity in guidance on weight management in their first pregnancies.

To summarise, women expressed a need for further guidance in relation to how much weight to gain during pregnancy. Notably, credible guidance was particularly important for *all* South Asian women, who often encountered conflicting information from health professionals and family. In addition, some women from this background voiced a desire for more enhanced guidance on weight management in the first pregnancy. This suggests that South Asian women’s mindlines evolved from the experiential knowledge from their previous pregnancies, which now yielded ideas of how other women should be supported.

#### *Perceived support from midwives*

Several women (including those who were South Asian) expressed frustration with the level of guidance that midwives provided about weight, which alluded to a need for further communication about this: *“So when they did not even ask to weigh or, nothing. I was kind of wow, ...why is like that?”* (P10). Another woman reported: *“(I)n all my er, sessions with the midwives I have noticed like they don’t talk that much about your weight management as much as they should. It’s usually me was asking them about my weight.”* (P12). These passages emphasise the discrepancy between women’s expectations and experiences of midwifery support with GWG. Moreover, the moral undertone accentuates the feelings of frustration that were often fused within women’s GWG mindlines.

Several women (including those from South Asian backgrounds) also referred to midwives’ workload, and the potential impact of this on their level of support: *“Er, when I go see the midwives, it’s just erm, they are really busy. And so, I think that where they can, that where they can just give, like hand us a leaflet or a booklet, that they think that’s just easier.”* (P20). In addition, some South Asian women described an escalation of their weight and associated health conditions. These formed the basis of their desire to receive support in relation to weight from midwives at an earlier stage of pregnancy: *“But at the end I got gestational diabetes...So I think that this this thing they should talk to you about this right from the beginning and talk to you about healthy eating, a bit of exercise...”* (P12). Another woman shared the following experience:

*“No-one’s ever actually discussed it [weight], like, you know, not my midwives...I’m slightly bit more heavier than I was in my previous pregnancy and...as a result of that I’ve you know I’ve had issues with varicose veins...at **that** point I did mention to my midwife that you know that my legs are hurting. And then she was just saying that you know, it’s obviously it’s, it’s it’s to do with the...size of the bump...”* (P20)

These extracts highlight the gravity of women’s conditions, and disappointment with not having received earlier guidance that may have prevented their onset. As a result, some South Asian women’s GWG mindlines were strongly shaped by discomfort from physical conditions, which intensified feelings of frustration with midwives’ support. In addition, one participant expressed a sense of dissatisfaction with how midwives communicated with her about weight: *“So, like, obviously they were running through the basics of the, the healthy eating, ...But, almost like, they sort of almost treated it like they were talking to a child (laughs).”* (P16). This extract suggests a feeling of being patronised, which points to a need for more complex guidance in relation to nutrition.

However, other women (including those who are South Asian) described positive experiences of midwifery support that enhanced their knowledge. These included the provision of information about the risks of excessive GWG and practical guidance on nutrition, physical activity, and reading food labels: *“I was made to understand that if, at some point in time, during my pregnancy journey, I gain excessive weight and could pose a risk to the pregnancy, ...”* (P2). In addition, another woman reported: *“(S)he told me to look at all the, you know, when you get the box of cereals, there is a list of ingredients and everything, she told me.”* (P19). These participants acquired valuable knowledge in relation to risk and how to read food labels, which suggests that their mindlines were enhanced by their recent consultations with midwives.

Overall, women described diverging levels of support from their midwives. Whilst some reported a need for further communication and guidance to support healthy weight gain, others shared useful knowledge imparted by midwives that served to enhance their mindlines. However, some South Asian women’s mindlines stemmed from the discomfort and frustration that their physical conditions generated. Inevitably, these incited a desire for guidance on weight at an earlier stage of pregnancy.

### *Social influences*

Several South Asian women shared challenges arising from cultural messages within their social networks. These highlighted: i) preferences for larger babies: *“I think this this thing is*

cultural as well. That you, you feel proud when you (laughs) when you have big fat babies (laughs), which is wrong..." (P12) and ii) beliefs that consuming butter will support a healthy delivery: "Oh, that [advice to eat butter] was...given by our mothers, but obviously it was er, when you are going for a natural delivery. They say it's easier for you to give birth." (P19). These accounts convey the direct and implicit influence of social networks in conveying cultural beliefs about dietary practices. Whilst the participant in the first extract questioned this assumption, the second extract was followed by an explanation that she consumed less butter because she was not having a natural delivery. Thus, in some instances, misleading messages had greater levels of influence on South Asian women's mindlines.

Furthermore, specific South Asian practices in relation to diet and resting during pregnancy were also highlighted. These presented barriers to healthy eating: "(T)he culture and the way families in our culture work is really like, well, "Oh, let me make you a really greasy curry", which isn't gonna help." (P11). Additionally, physical activity was hindered: "But yeah, back home, obviously there are different things. Like, women, they are so much pampered during their pregnancy. They don't really **work** that much, like most, most of them, **all**." (P12). As such, observed cultural practices mediated how South Asian GWG mindlines developed during socialisation and created a sense of divergence with Western advice.

Although women from all ethnic backgrounds experienced challenges and facilitators in relation to their social influences, these were particularly strong amongst women who were South Asian. For example, some of these women described a forceful tone to the dietary advice of family members: "You know that, that pure butter and all that. Yeah, so my Mum was like, pushing me to it. It's not like, too bad of an advice I would say. But, if you are, er, doing other things as well, if you are **active**,..." (P12). Another woman shared that: "(T)here was this constant always surrounding food just constantly like in terms of **what** I was eating and **how** I was preparing it and **how** much I was eating...from my family ...I found it quite stressful." (P20). These extracts accentuate the perceived dominance of South Asian family members. The first participant provided some rationalisation of her mother's advice, whilst the second revealed the anxiety that this generated. Thus, South Asian women's GWG mindlines comprised varied perceptions of the vigilant gaze of family members.

Unlike women from other ethnic groups, some South Asian women experienced difficulties in contending with family advice to engage in less physical activity: "(E)ven if there's advice telling you that you can [exercise], when somebody's telling you that you shouldn't, like it, like you get a bit paranoid, like "What if I do it and something goes wrong?" (P11). Another report of advice was that: "Especially old ladies...Some of their advices are very helpful. I would say that because they got **more experience**... They say just eat what you eat and

*just relax. Take it easy.*" (P18). These excerpts convey an expectation to rest more that was internalised within some South Asian women's GWG mindlines. However, participants managed this in distinctly unique ways. Whilst the participant in the first extract revealed a sense of anxiety tied to her struggle with reconciling different sources of advice, the second placed more confidence in this guidance.

Overall, however, women described feelings of scepticism regarding societal expectations to both consume and rest more. Indeed, these conflicted with newer knowledge acquired from messages that they would not need many more calories, and family support of physical activity. Furthermore, many women (including those who are South Asian) reported positive experiences or a preference for group-based support from other pregnant women. These encompassed exercise classes to maintain motivation to remain active and useful knowledge exchange with others in relation to weight, nutrition, and exercise. Consequently, social networks had diverging levels of impact on women's GWG mindlines, ranging from problematic to more constructive forms of guidance. However, for South Asian women, social influences exerted a particularly compelling impact on their GWG mindlines, which led to challenges in engaging in physical activity and maintaining healthy eating habits.

#### *Environmental factors and physiological changes*

These factors were juxtaposed by their external (environmental) and internal (physiological) origins. However, they served as equally powerful influences on their GWG mindlines. To illustrate, environmental factors were described as barriers to maintaining physical activity and a healthy diet. For instance, some women (including those from a South Asian background) described gyms as costly and sometimes lacking in suitable services: *"Cause gyms are expensive and it doesn't, doesn't really help when you know you, ...not all of them provide a facilities for pregnant ladies."* (P19). Other perceived barriers to PA included concerns about neighbourhood safety and the weather. In addition, many women (including those who are South Asian) reported that physical activity was impeded by lockdown restrictions: *"I will go for walk...and I might go out a bit, but because of a COVID lockdown, I haven't been much out."* (P18). Furthermore, a minority of non-South Asian women cited the weather as a barrier to exercise.

Environmental barriers to healthy eating were revealed in some non-South Asian women's concerns that the cost of fruit and vegetables hindered their food choices: *"I have experienced it myself, where it's a lot easier and a lot cheaper to buy, you know, ready-made processed foods, compared to, you know like, organic fruit and vegetables can be very expensive."* (P9). A minority of women's mindlines (including those who are South

Asian) were also challenged by the ease of access to fast food: *"It's gonna be so much easier for me to just get up, put pizza in the...oven rather, or order some takeout...than it is for me to... cook myself a healthy meal."* (P11). Consequently, environmental factors had a notable influence on women's GWG mindlines and readiness to maintain healthy eating and physical activity.

Physiological changes were reported to provide challenges and facilitators. For instance, many women (including those from South Asian backgrounds) experienced difficulties in engaging in physical activity due to tiredness and pain: *"Dizziness accompanied by pregnancy. Yeah. Then like my legs. I was not feeling like, doing anything, like, for three months."* (P13). Furthermore, nausea and cravings were described as barriers to maintaining a healthy diet: *"Because I could only eat really kind of bland, and.. erm, like beige food up until probably about 26 weeks. So, erm, you know, that made it a little bit more, erm, difficult in terms of maintaining a healthy diet."* (P4). Another woman shared her experience of food cravings: *"I know I'm having really, like **sugary** cravings, like all I wanna eat all day is cake and pancakes, and whipped cream, stuff like that."* (P11). As such, physical symptoms were deeply entwined in women's mindlines, which created barriers to maintaining activity and being mindful of nutrition.

However, a minority of women (who were not South Asian) reported effective strategies for managing physiological changes, such as questioning the necessity of craved foods and using physical activity to enhance their mood. These may have been mediated by personal values prioritising their health, which served to bolster women's GWG mindlines and foster healthy eating and physical activity. In addition, some physiological facilitators of healthy eating and physical activity were revealed amongst non-South Asian women, which comprised: i) cravings for fruit and vegetables and ii) reports of increased energy in the second trimester. Overall, then, physiological changes had multiple influences on women's GWG mindlines and subsequent health behaviours. However, the absence of reported facilitators amongst South Asian women may suggest a greater sensitivity to physiological changes within their GWG mindlines compared with non-South Asian women.

#### *Women's protective values to safeguard their health and that of the baby*

Many women's accounts (including those who are South Asian) revealed that their mindlines were influenced by personal values to safeguard their health and that of the baby. However, these unveiled dual barriers and facilitators of healthy eating and physical activity. For instance, some women (including those from South Asian backgrounds) alluded to beliefs that eating more will benefit the baby: *"I agree with that – "eat for two" for two because, er,*

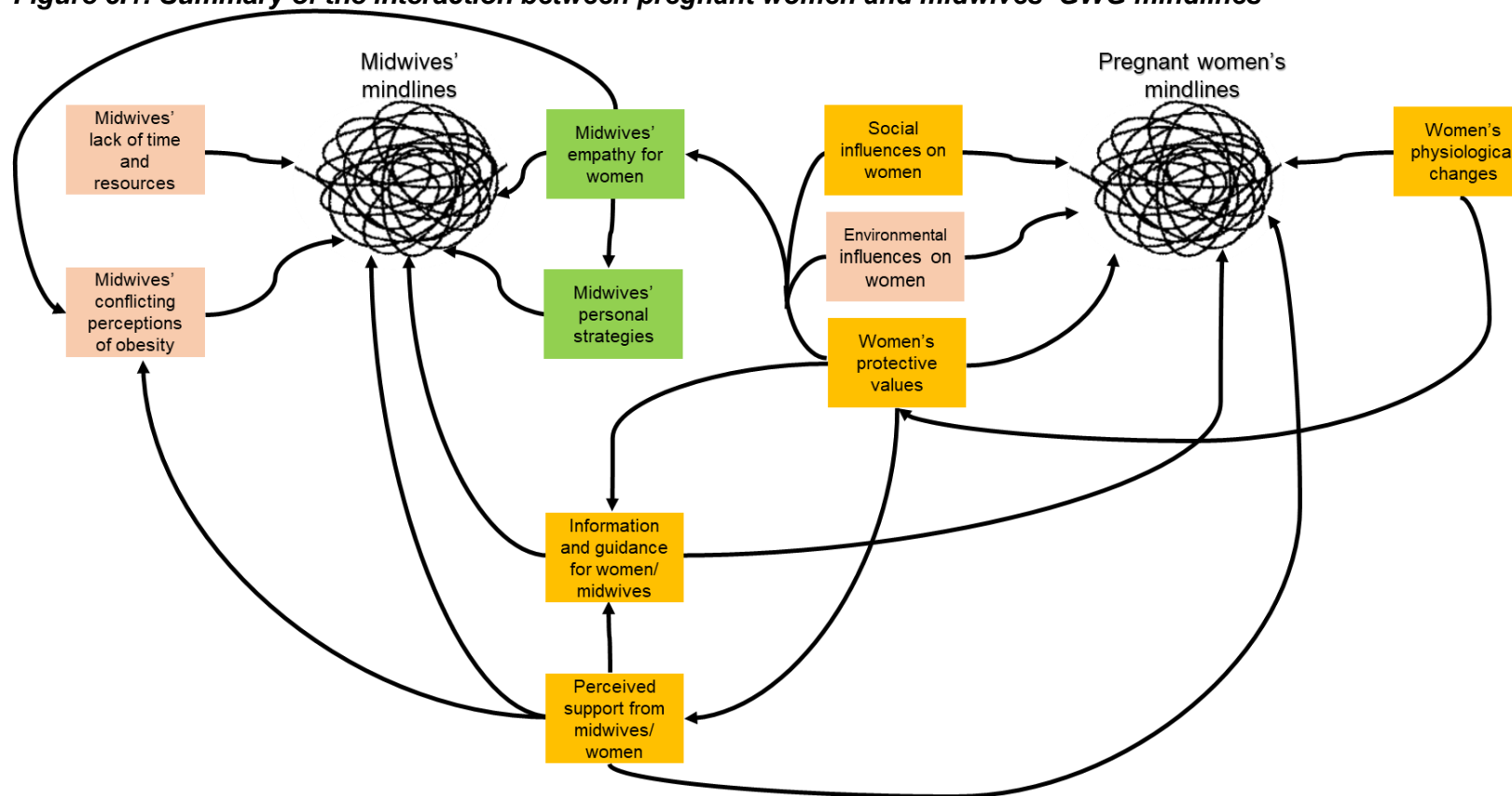
*end of day you're carrying a human inside you, and you want to see your child after nine months.*" (P18). Women (including those who are South Asian) also shared concerns regarding the safety of physical activity during pregnancy: *"I think the other risk is, maybe you can fall during exercise, and maybe that can endanger your child and you also."* (P13). These accounts highlight personal, emotive values promoting the importance of the baby's health that guided women's mindlines. The belief in the first was connected with a sense of responsibility to protect the baby. The participant in the second passage disclosed fears concerning physical activity during pregnancy, which were linked with concerns for her and the baby's welfare.

However, the majority of women's protective values served to enhance their GWG mindlines and facilitated healthy eating, exercise, and the pursuit of reliable guidance on weight management. Some examples of the supportive impact of women's protective values were exemplified when they reflected on their weight, and the potential impact of this: *"Erm, a few of them [risks] are quite relevant to me as well with my family history, so that, combined with with being overweight, is something that I've tried to really read up on."* (P9). Another woman reported the following: *"I was over, overweight already and my BMI was higher. So she told me that it is better to keep it...on the low one. So I was looking at all the things and trying to eat sensibly..."* (P19). These descriptions highlight women's sense of duty to protect their health, which was linked with their weight status (and family history for the first participant). In these instances, women's GWG mindlines were enriched by their protective instincts, which served as productive sources of influence on information-seeking and nutrition. In summary, many women's GWG mindlines were influenced by their perceived responsibility to protect their future health and that of the baby. On some occasions, this led to misinformed beliefs about nutrition and physical activity. On others, however, women's need to nurture had a conducive role in enhancing their GWG mindlines.

Overall, there was evidence for an interaction between women and midwives' GWG mindlines. For example, both groups' mindlines were connected by their perceived support or engagement from one another, which often reinforced midwives' conflicting perceptions of obesity. In addition, midwives' empathy often stemmed from women's protective values and the social and environmental factors that influenced their GWG mindlines. Figure 6.1 provides a summary of how the sources of women and midwives' mindlines interacted in relation to gestational weight management. Mindline sources are provided in boxes and are colour-coded to indicate facilitators of healthy behaviours or midwifery support of this (green), barriers (orange) and dual facilitators and barriers (amber).



**Figure 6.1: Summary of the interaction between pregnant women and midwives' GWG mindlines**



#### **6.2.4 Summary of women and midwives' mindlines**

To conclude, both women and midwives' mindlines developed through a synthesis of diverse evidence during socialisation. In addition to an awareness of information and guidance, their descriptions conveyed tacit understanding (which included beliefs and perspectives reinforced by emotions and technical know-how). Such awareness served as pathways mediating their mindline development during socialisation. For example, both groups shared a trust in credible guidance, which had the potential to enhance their mindlines. However, they similarly voiced a need for more detailed information and guidance to support their behaviour or practice. In addition, perceived support from the "other" was a defining aspect of women and midwives' mindlines and experiences. Both groups described varied levels of support/engagement from one other within the midwife-woman relationship. The emotive tone of their descriptions suggests that their GWG mindlines evolved in tandem with events in the later period of their socialisation.

Women's mindlines were also a synthesis of ongoing social and environmental influences, as well as their physical symptoms of pregnancy, and sense of duty to protect their health and that of the baby. Furthermore, the desire for credible information sources was particularly notable amongst all South Asian women, whose mindlines frequently reconciled diverging information from health professionals and family members. Indeed, social influences were particularly strong for women from this background, who encountered wider messages (such as a preference for larger babies), and more persistent family pressure to consume more.

Midwives' mindlines developed through a reconciliation of their experiences from clinical practice with their desire to safeguard women's health, alongside the social and environmental constructs that pervaded women's mindlines. Consequently, both women and midwives' GWG mindlines were connected by socially constructed knowledge derived from the distant and recent past, and their future needs in ensuring or supporting healthy GWG.

#### **6.2.5 Synthesis of literature review and Stage 1 findings for co-design workshops**

An overarching synthesis of literature and Stage 1 interview findings revealed challenges and enablers of i) healthy weight management amongst pregnant women and ii) the support of this amongst midwives. Figures 6.2 and 6.3 provide a summary of these findings. The categories are colour-coded as follows: amber – findings that applied to the literature review, green – findings that applied to the interviews, and orange – findings that applied to both of

the above. A summary of the findings for pregnant women and midwives is provided below each diagram.

**Figure 6.2: Synthesis of literature review and Stage 1 interview findings for pregnant women**

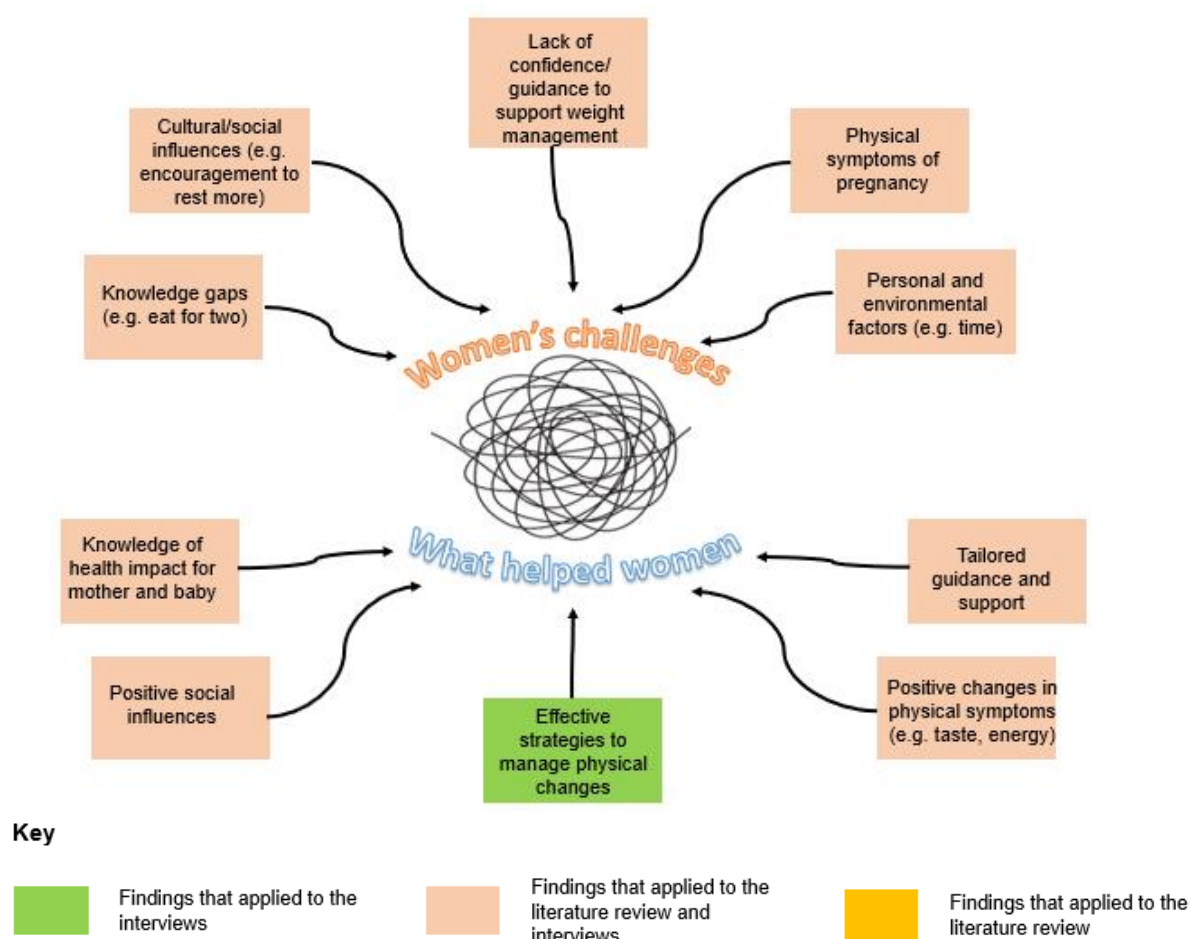
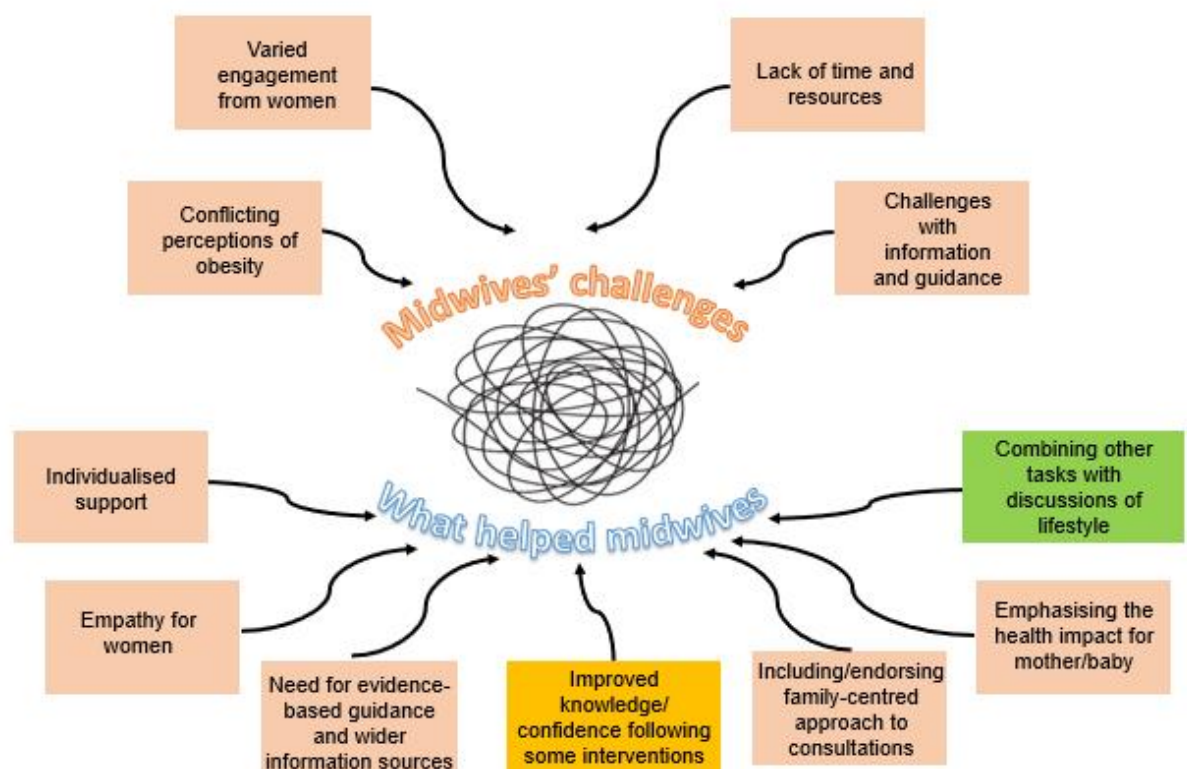


Figure 6.2 indicates that women's GWG mindlines were challenged by a range of sources that generated difficulties in relation to healthy GWG – from the physical symptoms of pregnancy to cultural, social, and environmental influences. As such, multiple forms of knowledge mediated women's mindlines and subsequent experiences of GWG. Although the physical symptoms of pregnancy often presented challenges within women's GWG mindlines, they were counterbalanced by positive changes in taste and increased energy in the second trimester. Additionally, some non-South Asian women who were interviewed reported effective strategies for managing physical symptoms such as questioning the need for craved foods. However, these positive physiological changes and personal strategies were not reported by South Asian women.

Women in the literature reviews and interviews similarly reported a lack of confidence or guidance in managing their weight or lifestyle. Furthermore, the two sets of findings highlighted some evidence of increased knowledge and support with GWG as a result of guidance (from midwives or interventions) that was tailored to their needs. Across both datasets, many women's mindlines were enhanced by their knowledge of the health impact of excessive GWG for the mother and baby, and positive social influences such as encouragement from friends or family to exercise more. Whilst some women who were interviewed reported that their midwives were a helpful source of dietary advice, those in the literature reviews described a need for more clarity from health professionals (including midwives) about their guidance and for this to be tailored to different cultures and weight gain trajectories. Therefore, the guidance of midwives either enhanced women's mindlines or created a sense of ambiguity within these.

**Figure 6.3: Synthesis of literature review and Stage 1 interview findings for midwives**



#### Key

<span style="display: inline-block; width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black;"></span> Findings that applied to the interviews	<span style="display: inline-block; width: 15px; height: 15px; background-color: #FFDAB9; border: 1px solid black;"></span> Findings that applied to the literature review and interviews	<span style="display: inline-block; width: 15px; height: 15px; background-color: #FFD700; border: 1px solid black;"></span> Findings that applied to the literature review
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The findings for midwives were largely similar across the interviews and literature reviews. The following mindline sources for midwives triggered particularly strong challenges with supporting women with their weight: i) conflicting perceptions of obesity, ii) varied engagement from women, and iii) a lack of time and resources. However, a finding that was unique to those interviewed was the strategy of combining tasks with discussions of diet and exercise to address time restrictions. Interviewed midwives also reported organisational norms that place a greater emphasis on risk than prevention in Midwifery guidance. These were described as a potential barrier to discussions of weight and the prioritisation of this (grouped within challenges with information and guidance). Thus, organisational norms sometimes created a sense of rigidity within midwives' GWG mindlines. Despite this, midwives' descriptions revealed their empathy for women and personal strategies to advise and support them across the interviews and literature reviews. These helped to enhance midwives' mindlines and resultant readiness to advise women about weight gain.

To summarise, women and midwives' GWG mindlines continually evolved in response to multiple, often competing sources of influence. The main areas of unity across both groups' mindlines were a need for further information/guidance and the enabling influence of evidence for the health impact of excessive GWG in guiding healthy lifestyle behaviours or midwives' support. However, the prominence of other sources also shaped the composition of women and midwives' mindlines and determined subsequent pathways of influence on behaviour and practice. For example, the physical symptoms of pregnancy often constrained women's GWG mindlines and culminated in barriers to healthy eating and physical activity. Furthermore, the perceived sensitivity of weight reflected the emotive origins of midwives' mindlines and accounted for their feelings of reluctance to discuss weight. The scripts and links to the digital stories summarising the experiences of pregnant women and midwives can be found in appendix 12.

### **A reflexive account of the synthesised literature review and interview findings**

I am able to identify with many of the framework categories summarising pregnant women's experiences (including those who are South Asian). For instance, I have frequently received advice from family members to "build (my)self up" and that gaining some weight will generate more "strength". This has often felt frustrating and aligns with some women's reports of cultural preferences for larger babies. Food also carries with it a sense of tradition and superstition in Indian culture. At a pre-wedding cooking event, I was advised that eating more of the food will mean that I will marry soon. As such, women's social and cultural influences resonate strongly with me.

Women and midwives' need for trusted sources of guidance is also pertinent for me. When discovering that I have an ovarian cyst, I became pre-occupied with searching online for advice and recommendations surrounding natural remedies. Google searches generated a breadth of answers: use a heat pad, drink ginger tea, have turmeric, walk more, don't do too much cardio... My head was spinning from the sea of suggestions. Thus, given my personal experiences, the need for credible guidance for pregnant women and midwives is perfectly rational. Women's physical barriers to exercise (in the form of tiredness and pain) is also a theme that I am able to identify with. Pain from my cyst compelled me to shift my exercise routine from running three times a week to daily walks. This was an uncomfortable transition, and I missed the pure joy and exhilaration that running gave me. The feeling of the air hitting my lungs and near-breathlessness (sensations that once overwhelmed me when I was starting out), later comforted me and provided a gateway to emotional shifts and mental breakthroughs. Tuning in to the sights and sounds of the birds, and trees rustling in the wind always brought me closer to nature and feelings of ease. I therefore acknowledge my biases in interpreting women's experiences in light of the personal value that physical activity holds for me.

## 6.3 Stage 2 – Co-design workshops

The ultimate purpose of the workshops was to co-design prototype strategies to influence midwives' mindlines and support them to have culturally sensitive consultations about weight with South Asian pregnant women. These would *combine* the *externalised* practical understanding of these groups with research evidence and guidelines. As discussed previously (chapter 5), this was achieved through sub-objectives for each workshop. This section will provide an overview of the participants, purpose, content, and outputs across each workshop. This will be followed by an overall summary of how women and midwives' mindline influences derived from the literature reviews, interviews and co-design workshops informed the content of the prototype strategies to enhance midwives' mindlines.

Table 6.2 provides a summary of how many individuals attended each workshop between September and November 2022.

**Table 6.2: Summary of individuals who attended each workshop**

Participant	Role	Workshop 1	Workshop 2	Workshop 3	Workshop 4
P12*	New mother	✓	✓	✓	✓
P20*	Pregnant woman	✓			
M1*	Midwife	✓	✓	✓	
M7*	Midwife	✓	✓	✓	✓
M9*	Midwife	✓			
F1	Facilitator	✓	✓	✓	✓
F2	Facilitator	✓	✓		✓
F3	Facilitator	✓	✓	✓	✓

\*Participant took part in stage 1 interviews.

The length of workshops ranged from 25 minutes and 49 seconds to one hour and 18 minutes (median = 53 minutes and 30 seconds). Data from the workshops were deductively mapped against women and midwives' mindline sources and corresponding strategies to enhance their mindlines within the analysis frameworks created from the interview and literature review data. Tables 6.3 and 6.4 provide a summary of the frameworks for midwives and pregnant women (including those who are South Asian) respectively. These are followed by an overview of how each workshop informed the next. Here, data were extracted to ensure that the purpose of each workshop was achieved. Subsequently, a summary of how women and midwives' mindline sources derived from the literature reviews, interviews, and co-design workshops informed the content of the prototype strategies is provided.

**Table 6.3: Mindline-based challenges and strategies to enhance mindlines derived from the literature reviews<sup>3</sup> and Stage 1 interviews for midwives**

<b>Mindline-based challenges</b>	<b>Strategies to enhance mindlines</b>
<b>Conflicting perceptions of obesity</b> <ul style="list-style-type: none"> <li>Weight as a sensitive subject and concerns with causing offence (interviews and review 1).</li> <li>Midwife's body image as a barrier to discussions (interviews and review 1).</li> <li>Societal stigmatisation or normalisation of obesity as a barrier to advice or effective guidance (interviews and review 1).</li> <li>Difficulties in maintaining a non-judgemental stance (review 1).</li> </ul>	<b>Evoke midwives' empathy</b> <ul style="list-style-type: none"> <li>Empathy with women's social, emotional, and individual challenges supported a shared understanding with women (interviews and review 1).</li> <li>Perceived responsibility to help protect the health of women and that of their babies served as a motivator to support women with their weight (interviews and review 1).</li> </ul>
<b>Challenges with knowledge and guidance</b> <ul style="list-style-type: none"> <li>A need for more knowledge/guidance to support provision of advice on weight management during pregnancy (interviews and review 1).</li> <li>A need for more tailored resources to support women from ethnic minority backgrounds (interviews and review 1).</li> <li>Absence of guidance on healthy levels of weight gain as a barrier to confidently advising women (interviews and review 1).</li> </ul>	<b>Provide midwives with evidence-based guidance and show value of individualised support and combining guidance with other information sources</b> <ul style="list-style-type: none"> <li>Improved knowledge/confidence following some evidence-based interventions (review 1).</li> <li>Tailoring advice to woman's individual context facilitated effective support (interviews and review 1).</li> <li>Utilisation of wider information sources helped to guide discussions (e.g. practical information, dieticians) (interviews and review 1).</li> </ul>
<b>Varied engagement from women</b> <ul style="list-style-type: none"> <li>Women's engagement ranged from: i) emotional distress, ii) a lack of willingness to engage in discussions or change their diet, and iii) openness and positive lifestyle changes (interviews and review 1).</li> </ul>	<b>Emphasise personal strategies: highlight the health impact and include family/partners in consultations</b> <ul style="list-style-type: none"> <li>Accentuating the health impact for mother and baby was a strategy used by midwives (review 1). Midwives also expressed</li> </ul>

<sup>3</sup> Review 1 – Midwives' experiences of supporting healthy gestational weight management: A mixed methods systematic literature review



Mindline-based challenges	Strategies to enhance mindlines
	<p>a need for other colleagues to do this when providing the rationale behind weight monitoring (interviews).</p> <ul style="list-style-type: none"> <li>• Family/partner involvement as a strategy used (review 1) and advocated by midwives (interviews).</li> </ul>
<p><b>Lack of time and resources</b></p> <ul style="list-style-type: none"> <li>• Midwives reported a lack of time and competing responsibilities (interviews and review 1).</li> <li>• Midwives reported a lack of resources to support individualised care (interviews and review 1).</li> <li>• Organisational norms placing a greater emphasis on risk than prevention in Midwifery guidance as a barrier to discussions/prioritisation of this (interviews).</li> </ul>	<p><b>Emphasise personal strategy: combining other tasks with discussions of lifestyle</b></p> <ul style="list-style-type: none"> <li>• A midwife discussed the value of combining tasks with their discussions to address issues around time (interviews).</li> </ul>

**Table 6.4: Mindline-based challenges and strategies to enhance mindlines derived from the literature reviews<sup>4</sup> and Stage 1 interviews for pregnant women (including those who are South Asian)**

<b>Mindline-based challenges</b>	<b>Strategies to enhance mindlines</b>
<b>Knowledge gaps (e.g. eat for two)</b> <ul style="list-style-type: none"> <li>• Beliefs that weight management should be prioritised for post-pregnancy (reviews 2 and 3).</li> <li>• Concerns about the safety of PA (interviews and review 3).</li> <li>• Beliefs that pregnancy is a time to consume more (interviews and review 3).</li> <li>• Beliefs that cravings must be satisfied to prevent unpleasant incidents (review 3).</li> </ul>	<b>Enhance knowledge of the health impact for mother and baby</b> <ul style="list-style-type: none"> <li>• Women's protective values regarding the health of the mother and baby often served as a motivator for healthy eating and PA (interviews and reviews 2 and 3).</li> </ul>
<b>Cultural/social influences</b> <ul style="list-style-type: none"> <li>• Conflicting advice on diet and PA from friends and family (interviews and reviews 2 and 3).</li> <li>• Cultural preferences for larger body sizes (interviews and review 3).</li> <li>• Cultural dietary norms (interviews and review 3).</li> <li>• Pressure from family/friends to consume more (interviews and review 3).</li> <li>• Significant barriers to PA during pregnancy as a result of social influences (interviews and review 3).</li> </ul>	<b>Provide tailored guidance and support</b> <ul style="list-style-type: none"> <li>• Interventions that involved personalised support were regarded as more useful by women (review 2).</li> <li>• The majority of interventions that addressed cultural norms or traditions were effective, whilst those that encouraged women to bring partners, friends, or family were linked with a significantly reduced risk of excessive GWG and more incidents of vaginal birth (review 4).</li> <li>• South Asian women in review 3 and the interviews voiced a need for advice about diet and PA in the first trimester.</li> </ul>

<sup>4</sup> Review 2 – A systematic review of women's experiences of interventions to prevent excessive gestational weight gain

Review 3 – Barriers and facilitators to healthy gestational weight gain amongst pregnant women from ethnic minority groups: A systematic literature review with narrative synthesis

Review 4 – Interventions to support healthy gestational weight gain amongst pregnant women from ethnic minority groups: A systematic literature review with narrative synthesis

Mindline-based challenges	Strategies to enhance mindlines
<p><b>Physical symptoms of pregnancy</b></p> <ul style="list-style-type: none"> <li>• Barriers to PA (e.g. tiredness and pain) (interviews and review 3).</li> <li>• Challenges in maintaining a healthy diet (e.g. nausea and cravings) (interviews and review 3).</li> <li>• Pregnancy-related symptoms (e.g. tiredness, pain, food cravings) as barriers to engaging in interventions (review 2).</li> </ul>	<p><b>Provide tailored guidance and support</b></p> <ul style="list-style-type: none"> <li>• Women voiced a need for practical guidance on managing food cravings (review 3).</li> <li>• Non-South Asian women reported effective strategies for managing physical changes such as questioning the necessity of craved foods and using physical activity to enhance their mood (interviews).</li> </ul>
<p><b>Lack of confidence/guidance to support weight management</b></p> <ul style="list-style-type: none"> <li>• Insufficient/inconsistent guidance on how much weight to gain (review 3 and interviews).</li> <li>• A need for trusted (interviews) and practical (review 3) sources of information about diet and PA during pregnancy.</li> </ul>	<p><b>Draw upon positive social influences and provide tailored guidance and support</b></p> <ul style="list-style-type: none"> <li>• There were some examples of friends or family encouraging a healthy diet or PA (interviews and reviews 3 and 4).</li> <li>• Women regarded interventions that provided personalised support as particularly useful (review 2).</li> <li>• Interventions with food suggestions tailored to cultural norms were linked with a reduced risk of excessive GWG (review 4)</li> <li>• Women voiced a preference for group-based support with nutrition and PA (interviews and reviews 2 and 3).</li> </ul>
<p><b>Personal and environmental factors</b></p> <ul style="list-style-type: none"> <li>• Competing responsibilities related to work and childcare as a barrier to engaging in interventions (review 2).</li> <li>• Time and family commitments as a barrier to healthy eating (interviews and review 3) and PA (review 3).</li> <li>• Limited access to affordable healthy foods and gyms as a barrier to healthy eating and PA (interviews and review 3).</li> <li>• Weather as a barrier to healthy eating (review 3) and PA (interviews and review 3).</li> <li>• Concerns about neighbourhood safety as a barrier to PA (interviews and review 3).</li> <li>• Limited neighbourhood facilities as a barrier to PA (review 3).</li> <li>• Lockdown as a barrier to PA (interviews).</li> </ul>	

### **A reflexive account of the co-design workshops**

I was pleased to see that my planning towards the first workshop contributed towards a highly productive session in which shared understandings of the evidence could be achieved. However, the shared images in the picture-sharing task highlighted less figurative approaches to the representation of experiences than I anticipated. Despite this, it was encouraging to note that power dynamics were not apparent when pregnant women showed an openness to sharing their experiences in the presence of midwives. However, it was frustrating to see attendance decline over the course of the workshops. Nevertheless, rich discussions of experiences and evidence took place. This suggests that the intimacy of a small group created a safe space for co-designers to share their perspectives. However, the transferability of the findings to other midwives and South Asian pregnant women will be limited as a result of the group size. Towards the end of the workshops, the group voiced preferences for education-based strategies. This created a sense of conflict with what I had learned about mindlines and the more complex, socially mediated process through which evidence moves into practice. As such, the content of the strategies was tailored to women and midwives' mindlines, whilst the format remained faithful to the group's preferences for education.

### **Workshop 1**

*Participants:* One South Asian new mother, one South Asian pregnant woman, three midwives, and three facilitators.

*Purpose:* To ensure a thorough and shared understanding of weight management during pregnancy between midwives, pregnant women, and new mothers.

#### *Content:*

- i) Sharing and discussing pictures that would help to *externalise* practical knowledge of weight management during pregnancy.
- ii) Presenting and initiating a discussion of research evidence and guidance within the digital stories (appendix 12) and quiz to ensure that this was *combined* with co-designers' practical knowledge.

#### *Outputs*

*Practical understanding of weight during pregnancy externalised from the picture-sharing task*

To reiterate, participants were invited to bring a picture that reminded them of weight during pregnancy. The following images were shared: i) a pregnant woman stepping on the scales (M7 and P12) and ii) an aqua-natal aqua-aerobics class (M1). M9 described a picture of herself that highlighted her weight gain during her first pregnancy but did not share this. Overall, the images were unsurprising and revealed more literal conceptions of weight

management than predicted. However, they helped to start a conversation about weight management during pregnancy. M1 highlighted the importance of exercise and valuing different shapes and sizes: *"No-one was comparing their bodies and we ...could all feel comfortable about exercising, comfortable about our changing bodies..."*. This reveals the potential for group-based exercise to enhance women's confidence in PA during pregnancy. However, challenges with weight management during pregnancy were also reported. For instance, a lack of communication about weight from midwives was described: *"I was under the impression in my first pregnancy as well - 'Why do midwives not talk about weight?'.....So I was just checking on my own, all the time."* (P12). Additionally, societal messages around eating for two were alluded to: *"I literally just thought you kind of 'eat for two', and, I just ate cakes. I just loved it for nine months. But then, um, I did suffer the health implications towards the end of my pregnancy."* (M9). These extracts highlight the influence of perceived support from midwives and societal messages for women on women and midwives' GWG mindlines. Thus, the picture-sharing task supported co-designers to reflect upon their own experiences of weight management during pregnancy.

#### *Discussion of research evidence from digital stories in relation to co-designers' practical understanding - including areas of agreement and disagreement*

##### *a) Digital story of pregnant women's experiences*

Co-designers were presented with a digital story in relation to a South Asian woman's experiences of weight management during pregnancy. The script and link to this is provided in appendix 12. The story captured the experiences of pregnant women across the literature reviews and interview findings, and included key quotations from the data, relevant Getty images (2022), and a voiceover to narrate the story. This helped to ensure a shared understanding of weight management during pregnancy between midwives, pregnant women, and new mothers. In addition, the discussion of this helped to ensure that the evidence within the story was *combined* with co-designers' practical knowledge. Word clouds were used to invite co-designers to share their views on each digital story. The purpose of these was to facilitate discussions to ensure a *combination* of the research evidence with co-designers' practical understanding. A copy of these is provided in appendix 28.

South Asian women reported identifying with the story, which suggests that the evidence was effectively combined with their practical knowledge. Thus, a shared understanding was achieved. The following challenges were consistent with the literature review and Stage 1 interview findings for pregnant women: i) lack of communication about weight from midwife and ii) social influences. For instance, one co-designer reported resonating with the lack of

discussion about weight from the character's midwife: *"When I asked her she (midwife) said 'We're not worried about your weight, because your weight is not a measure of how much healthy or like what impact would it have on the baby...'"* (P12). Another co-designer agreed with the familial pressure to consume butter: *"In our culture there is a big emphasis on 'You should have these kind of things (milk and butter) towards the end of your pregnancy and even post-pregnancy...'"* (P20). These descriptions highlight women's feelings of frustration with the lack of communication about weight from midwives, and cultural messages about the consumption of butter. Therefore, South Asian women's GWG mindlines were often challenged by socially or culturally constructed guidance that appeared to conflict with their own perspectives.

A midwife also commented on the digital story and revealed shared understanding with the character's lack of advice from midwives. Specifically, she expressed concerns that corresponded with midwives' need for further guidance within the synthesised literature review and interview findings (figure 6.3). She explained that the guidance for midwives places more emphasis on what women *shouldn't* eat due to fears of harming the baby. *"I think the emphasis is on...what you shouldn't be eating...And I think it's, it's not really geared on weight management...So it's knowing what else you can, you can recommend from a cultural perspective as well."* (M7). Here, the evidence within the story was combined with her practical understanding of guidance to support midwifery practice. Indeed, this midwife highlighted a need for further guidance to support: i) dietary guidance regarding weight and ii) the tailoring of this to women from ethnic minorities.

#### b) Digital story of midwives' experiences

Co-designers were presented with a digital story in relation to a midwives' perspectives of advising and supporting women with their weight during pregnancy. The script and link to this is provided in appendix 12. This similarly depicted the experiences of midwives across the literature reviews and interview findings, and included key quotations from the data, relevant Getty images (2022), and a voiceover to narrate the story. This helped to ensure a shared understanding of weight management during pregnancy between co-designers. Subsequently, there was a discussion of the story to ensure that the evidence within this was *combined* with co-designers' practical knowledge.

As identified in the literature review and interviews, midwives reported being able to identify with the perceived lack of time to have discussions about weight. Their reports reinforced the strength of influence of the following mindline sources (confirmed in the literature review and Stage 1 interview findings): i) a lack of time and resources and ii) a need for more

knowledge/guidance. For instance, midwives' perceived lack of time was highlighted in the following account: "*So someone of a normal weight where it's not causing them any problems at all - I don't think it would actually be a conversation that would be raised because of time pressures.*" (M9). In addition, the need for further guidance about the most appropriate time to discuss weight gain was expressed: "*(T)here needs to be more clear guidance for midwives as to when would be the appropriate time to discuss weight gain...And also the information needs to be there to help them...safely manage their weight after, uh, the birth as well.*" (M1). These reports indicate a combination of the evidence from the digital story with the group's practical knowledge. South Asian women did not comment on the digital story of midwives' experiences. Overall, however, the digital stories of women and midwives' experiences resonated with the group's understanding of weight gain during pregnancy.

c) *How research evidence and guidance from the quiz related to co-designers' practical understanding*

The questions within the quiz were based upon a *combination* of findings from the literature review and wider research evidence in relation to effective gestational weight management. This provided an insight into the following modifiable determinants of healthy gestational weight management: i) nutrition, ii) physical activity, iii) emotional health, and iv) sleep. The purpose of the quiz was to facilitate a shared understanding of scientific research evidence in relation to effective weight management techniques. In addition, the use of word clouds helped to initiate discussions during the quiz, which then helped to ensure that the research findings were *combined* with the practical knowledge of co-designers. A copy of the word clouds is provided in appendix 29.

The group shared their perspectives in relation to the quiz and subsequent guidance on food cravings, nutrition, and sleep. These are provided below. Physical activity and emotional health were not commented upon, which suggests less divergence between their mindlines and the guidelines within these themes.

a) Food cravings

A shared understanding was largely achieved in relation to food cravings during pregnancy being within a woman's control. The group generally agreed with the guidance on psychological strategies to manage these (Weingus and Adams, 2022). Furthermore, their reports revealed a *combination* of this with their practical understanding. For example, as reported in the literature review and interview findings, midwives described the value of tailored support in assisting women. One midwife noted that individualised guidance may be

more appropriate in supporting women than a general psychological tool: *“I think it’s also very individualised in the sense that it’s not always gonna be applicable to all”* (M1). Another midwife described the need to acknowledge cravings for healthy foods: *“It’s not always gonna be cake. It can be like salad and vegetables, so it’s about **moderation** rather than...telling a woman to restrict herself...”* (M9).

Another finding that reflected the literature review and interview findings was the reference to unhelpful social influences. Here, it was reported that beliefs around the baby needing certain foods also need to be addressed: *“Yeah, I think it depends on your beliefs as well. Like when they say...I have even heard during my pregnancy that if you have craving like it’s because your baby needs it.”* (P12). As such, co-designers’ GWG mindlines encompassed a broad understanding of the practical relevance of research evidence.

#### b) Nutrition

A shared understanding was similarly achieved in relation to the nutritional guidance presented within the South Asian Eatwell guide (Jay, 2021) and simple swaps to reduce sugar intake (British Heart Foundation, 2018). As captured in the literature reviews and interviews, a desire for further guidance on providing specialised advice for women from other backgrounds and different dietary requirements was expressed: *“How many of those charts are available for all different cultural backgrounds...and...different dietary requirements?”* (M1). Co-designers also combined the nutritional guidance with their practical knowledge. For example, midwives emphasised the importance of highlighting traffic light symbols to women: *“But it’s maybe just somehow...reiterating those traffic lights that come on those foods just as a clear guide because red and the green is quite evident to people even if they can’t speak English...”* (M9). They also reported a need to remind women to check the ingredients of exported foods that do not have a traffic light symbol: *“So it’s highlighting that fact that because it hasn’t got the traffic light system, you still need to look at the contents and what’s in the ingredients.”* (M7). Furthermore, the importance of checking what women are drinking as well as eating was emphasised: *“But what are they drinking?...And that’s missed as well sometimes.”* (M7).

As highlighted in the literature review and interview findings, women’s social and environmental barriers to healthy eating were confirmed. One South Asian woman explained that pregnant women tend to choose what is practical and convenient due to a lack of time and competing priorities such as family and work: *“You’ve got extra-curricular activities and...then you’ve got work and then deadlines and then you just, and you’re just on the go constantly. So, you just don’t think about these things until you get a moment...”* (P20). This



reinforces the impact of the social and environmental context on women's GWG mindlines. Overall, co-designers' practical understanding helped to determine the relevance of nutritional guidance for midwives' consultations and women's current lifestyle.

#### c) Sleep

There were few comments in relation to the guidance on how to enhance sleep quality during pregnancy (National Childbirth Trust, 2021). This suggests that a shared understanding was largely achieved. However, women's social and environmental challenges (confirmed in the literature review and interviews) were reinforced when one South Asian woman provided an insight into the feasibility of this guidance: *"When you have young children, that's not always achievable. It's just out of your control... And yeah, it does...it does affect the rest of my day then, and and how I eat..."* (P20). As such, her practical understanding was *combined* with the guidance to support the appraisal of this. The first workshop helped to ensure a thorough and shared understanding of weight during pregnancy, and the discussions of research evidence and guidance enabled a *combination* of this with co-designer's practical knowledge. This understanding of experiences and evidence helped to inform the subsequent workshop in which discussions were initiated of how consultations could be improved. After this workshop, co-designers received a thank-you e-mail with bullet points that summarised the activities in this session, and what will happen at the next session.

### **Workshop 2**

*Participants:* One South Asian new mother, two midwives, and three facilitators

*Purpose:* To form a shared understanding of what culturally sensitive consultations about weight with pregnant South Asian women should consist of.

#### *Content:*

- i. Confirmation of shared understanding of the experiences of midwives when providing support with weight and the experiences of pregnant women and new mothers when being supported with their weight.
- ii. Discussion of good and bad experiences of weight-related consultations to help to *externalise* knowledge of how these can be improved.
- iii. Discussion of ideas of how to influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women.
- iv. Briefly referring back to the scientific evidence of the health risks of excessive GWG to support the *combination* of this knowledge with co-designers' understanding of

what culturally sensitive consultations about weight with pregnant South Asian women should consist of.

### *Outputs*

A summary of the shared understanding of the experiences of pregnant women, new mothers and midwives was presented to the group in the form of PowerPoint slides with key quotes and flow diagrams. The group confirmed that they had no further thoughts to add. The section below provides an overview of the co-designers' reports of good and bad experiences, and the shared, externalised understanding of how consultations can be improved.

i. *What are good experiences of consultations about weight between midwives and South Asian pregnant women?*

A shared understanding was achieved regarding good experiences of consultations, and the value of detailed guidance for all women. This confirmed the need for further guidance for midwives and pregnant women in the interviews and literature reviews and built upon discussions related to nutritional guidance in the previous workshop. For example, one midwife emphasised the importance of sharing detailed guidance on foods with women when reflecting upon the valuable guidance of a dietician in supporting a South Asian woman who had been diagnosed with gestational diabetes: *"And it was really interesting...food that you would associate with being healthy and how high in sugar they can be and...how important those specific details are when sharing information with pregnant women."* (M1). Another midwife added that this guidance must not be restricted to those with gestational diabetes and should be shared with all women: *"(T)hat detailed knowledge of food contents – really, should be shared with **all** women...So...at booking, explain to the Mums: certain foods that ... (have) a high-sugar content..."* (M7). In addition, a South Asian new mother reported that her midwives provided her with useful advice regarding what she should and should not be eating when diagnosed with gestational diabetes: *"(T)hey told me what I should be eating and what not ... And I was like ohh, OK what else do I eat then? So obviously like they gave me other choices. And signpost me to websites where you can find like healthy snacks and meals..."* (P12). This corresponded with the interview findings that midwives were sometimes a helpful source of dietary advice.

ii. *What are bad experiences of consultations about weight between midwives and South Asian pregnant women?*

Co-designers' reports of bad experiences revealed a shared understanding of preferences for effective communication strategies and the provision of advice in early pregnancy. As

noted in the literature review and interviews, one midwife reported a need for more effective communication with women from ethnic minority backgrounds: *“I’ve witnessed that several times in lots of different settings, ...it’s...inadequate forms of translation...Partners don’t tend to know all the specific, especially midwifery specific terminology.”* (M1). In addition, reports of a lack of communication about weight from midwives in the literature reviews and interviews were reinforced by one co-designer. This highlighted an absence of advice at an early stage of pregnancy, which may have prevented the onset of gestational diabetes: *“I wanted to have my weight checked in appointments....But I, I wish that they would have given me those advices earlier in pregnancy. So I would be getting like, I would have got used to making healthy snacks for myself.”* (P12).

### iii. *What can we do to improve these consultations?*

Responses to this question conveyed a desire for a preventative, holistic, and pro-active approach to sharing advice. For instance, the value of culturally tailored communication with women in the community at pre-conception was advocated: *“I think preconception is just as important.... visuals and leaflets are important, but also culturally specific visuals and leaflets. And perhaps videos as well, thinking about those communication barriers.”* (M1). This aligns with midwives’ need for more tailored resources to support women from ethnic minority backgrounds (confirmed in the literature review and interviews).

Another suggestion that was consistent with the literature reviews and interviews related to the promotion of a family-centred approach: *“(I)t takes a community to raise a child. So it’s important that we don’t just catch the...woman...We need to catch her Aunties, Uncles, Dads, you know Grandmas so that they spread the message properly.”* (M7). Thus, targeting women’s social networks was regarded as an avenue to influencing women themselves. This reinforces midwives’ empathy with the social influences that shaped women’s GWG mindlines. Specific strategies to ensure effective knowledge-sharing included utilising visual tools: *“Having leaflets and stuff in first pregnancy...that would be considered useful I think.”* (P12) and doing a 30-minute talk on the topic at one of the Midwifery mandatory study days. Overall, the second workshop helped to form a shared understanding of what culturally sensitive consultations about weight with pregnant South Asian women should consist of. Specifically, this comprised detailed food guidance for all women, tailored advice, resources about the importance of healthy weight gain in early pregnancy, and a family-centred approach.

### **Workshop 3**

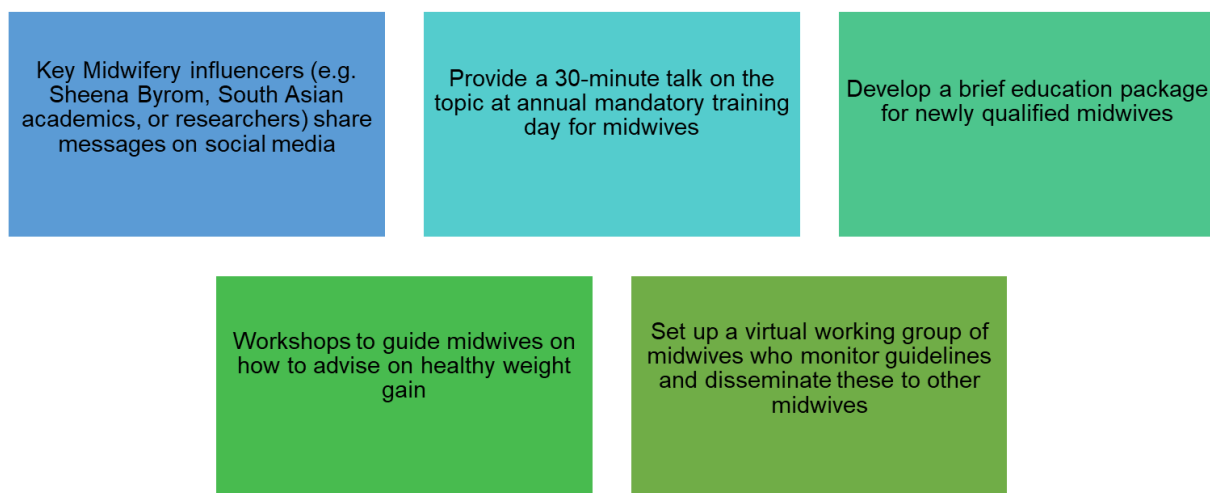
*Participants:* One South Asian new mother, two midwives, and two facilitators.

*Purpose:* To generate ideas of prototype strategies to influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women.

*Content:*

- i) Discussion of ideas of how to influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women. This helped to *externalise* their practical knowledge. The group were presented with ideas derived from the Stage 1 interviews and the second co-design workshop (figure 6.4 below). They were encouraged to add further suggestions if they wished.
- ii) Discussion of ideas in relation to preferences and acceptability. This involved considering how effective, practical, engaging, and demanding they would be based upon framework of acceptability (Sekhon et al., 2017). The discussion of these helped to ensure that the ideas of how to influence midwives were a combination of guidance, co-designers' practical knowledge, and research evidence (supported by referring back to this at the start of the session).

**Figure 6.4: Ideas presented to co-designers of how to influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women**



The ideas within figure 6.4 were derived from specific questions related to: i) participants' suggestions of how midwives could be best supported to help women in the interviews and ii) what can be done to amend and enhance mindlines and thus improve consultations between midwives and South Asian women in the second co-design workshop.

*Outputs*

### *1. Ideas of strategies to influence midwives to have culturally sensitive consultations about weight with South Asian pregnant women*

The following prompt questions were used to integrate research evidence and practical knowledge into the ideas: i) "Can you think of anything else that would be useful, given what we know about the role of sleep and emotional health as well as nutrition and physical activity?" and ii) "Is there anything else that anyone feels would be necessary, given what we know about experiences of the two groups, e.g. midwives' time pressures, the importance of them influencing the community, and information needing to be culturally tailored?" However, the group confirmed that they had no further ideas to add.

### *2. Preference and acceptability of ideas*

Overall, co-designers voiced a clear preference for providing a 15-minute talk on the topic at the annual mandatory training day and a brief education package for midwives. These aligned with midwives' lack of time in the interviews and literature review: *"I think it needs to be shorter (15 minutes) ... we cover all sorts in our mandatory training"* (M7). Furthermore, midwives' need for further information/guidance to support consultations was reinforced in relation to the education package: *"I think not just for newly qualified but for all midwives - I think that is probably the way forward..."* (M7). Thus, a 15-minute talk and brief education package were regarded as acceptable strategies to enhance midwives' mindlines and support them to advise pregnant women from a South Asian background about weight. Co-designers regarded workshops for midwives as less acceptable. For instance, the following comment accentuated midwives' lack of time in the interviews and literature review: *"Can I just say with erm, shift pattern and, and demands on wards and areas, to try and get staff into workshops, it's gonna be difficult..."* (M7). This suggests that workshops were considered as less conducive in supporting other midwives with their consultations. Consequently, this workshop helped to ensure that the ideas of prototype strategies were informed by a combination of co-designers' practical understanding, research evidence (from the ideas derived from the interviews and workshop 2), and guidance for acceptability (Sekhon et al., 2017).

## **Workshop 4**

*Participants:* One South Asian new mother, one midwife, and three facilitators.

*Purpose:* To gather feedback from co-designers in relation to the prototypes of their ideas.

### *Content:*

- i) Sharing and discussion of prototypes to *externalise* co-designers' practical understanding of what will work in practice.
- ii) Summary of the previous three sessions and personal takeaways.
- iii) *Combination* of the knowledge embodied within the prototypes with the feedback to inform their development after the session.

### *Outputs*

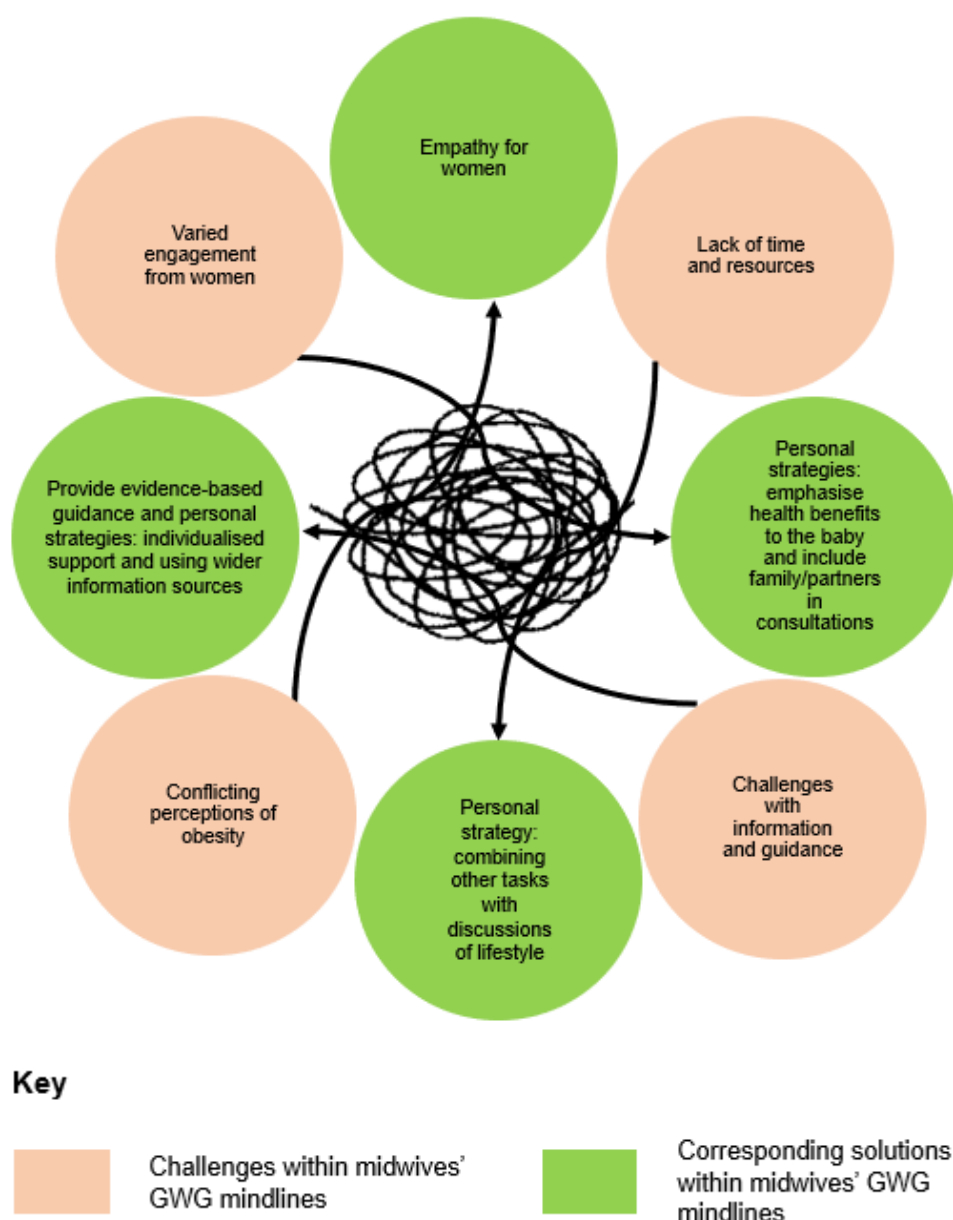
Appendix 30 provides an overview of the two prototypes that were presented to co-designers, which were developed within Microsoft PowerPoint. The group confirmed that the prototypes were relevant and suitable for further development. For instance, one co-designer stated that the digital story of women's experiences would be a useful component within the strategies: *"The film was good and definitely the feedback is important on that."* (M7). This confirms the value of evoking midwives' empathy for women. Indeed, this enhanced midwives' GWG mindlines and readiness to advise women about weight in the interviews and literature review. Another co-designer revealed that midwifery advice has the potential to override South Asian myths regarding the consumption of butter: *"(Y)ou mentioned things...like your mothers and all, they tell you to have like desi butter and all, and milk every day, every night. Like really tubs of that. So yeah, if, if it comes from my midwife, she's telling me that "OK, this can be too much" or so, obviously, I I would have listened."* (P12). This is consistent with the magnitude of women's social influences within the interviews and reviews. However, it also highlights women's need for trusted sources of guidance, which was revealed in the interviews. In addition, she added that there may be variations in the ability to engage women from different South Asian backgrounds depending on their language skills. That is, those who were educated and able to speak English were perceived as more receptive to midwifery advice: *"So if there is a woman who, like, was educated, who's good with language and all, maybe she might listen to you more...comparing to somebody who stays at home and who doesn't go **out** that much and who has problem with language..."* (P12). This corresponds with midwives' challenges in engaging some women in the interviews and literature review.

The group were asked if there is anything that they are taking away from their experience of being involved in the workshops. One co-designer shared that these had been useful and informative: *"It's been a good experience for me. I also, I have learned, learned many things in that."* (P12). Although the intention was to collect feedback regarding experiences of the co-design sessions, only one co-designer completed and returned the co-design feedback survey. Since only one response was provided, the transferability of this to the co-design group was diminished. Therefore, the process evaluation and analysis of the feedback could not be completed. Overall, the responses from co-designers in this workshop emphasised their practical understanding. Moreover, this aligned with the influence of the following mindline sources for women and midwives: i) women's social influences and need for trusted sources of guidance, and ii) midwives' varied engagement from women and their feelings of empathy for this group.

***Overarching synthesis of the mindline sources derived from the literature reviews, interviews, and co-design workshops***

Figures 6.5 and 6.6 below provide a summary of the challenges (in orange) and corresponding solutions (in green) within GWG mindlines amongst midwives and women respectively. These highlight the potential to strengthen the connections between different forms of knowledge within both groups' GWG mindlines, which are explained in further detail below.

**Figure 6.5: Challenges and corresponding solutions within midwives' GWG mindlines**



Although midwives' mindlines were challenged by conflicting perceptions of obesity (revealed in the perceived sensitivity of weight yet vigilance of the normalisation of obesity in society), their empathy towards women's protective values related to the health of the baby, and environmental and social challenges presented a suitable antidote to these perspectives. In addition, a lack of time and resources were common areas of defiance within midwives' mindlines and served as a barrier to advising and supporting women. However, a personal strategy to combine other tasks with discussions of lifestyle signalled a practical method to address these feelings of reluctance.



An absence of reliable information and guidance also challenged midwives' mindlines. For instance, midwives voiced a need for further clarity on how much weight women should gain, and a preference for tailored dietary guidance for women from ethnic minority backgrounds. However, the value of evidence-based guidance was apparent when some midwives expressed a desire for the scientific rationale behind weight monitoring. In addition, personal strategies such as the provision of individualised support and the use of wider information sources including traffic light labelling (British Nutrition Foundation, 2022) denoted potential solutions within midwives' GWG mindlines. Midwives' emotions were highly receptive to women's different levels of engagement, which influenced the evolution of their GWG mindlines and subsequent readiness to advise women. Despite this, the following personal strategies encompassed potential solutions within midwives' mindlines: i) emphasising the health impact to the mother and baby and ii) including family/partners in consultations. Thus, the following prominent sources within women's GWG mindlines had the capacity to enhance those of midwives: i) personal values prioritising health and ii) social influences. Midwives' improved knowledge/confidence following some interventions in the literature review (presented in figure 6.3) did not coherently map to a challenge and was therefore not included as a solution in figure 6.5.

**Figure 6.6: Challenges and corresponding solutions within women's GWG mindlines (including those who are South Asian)**

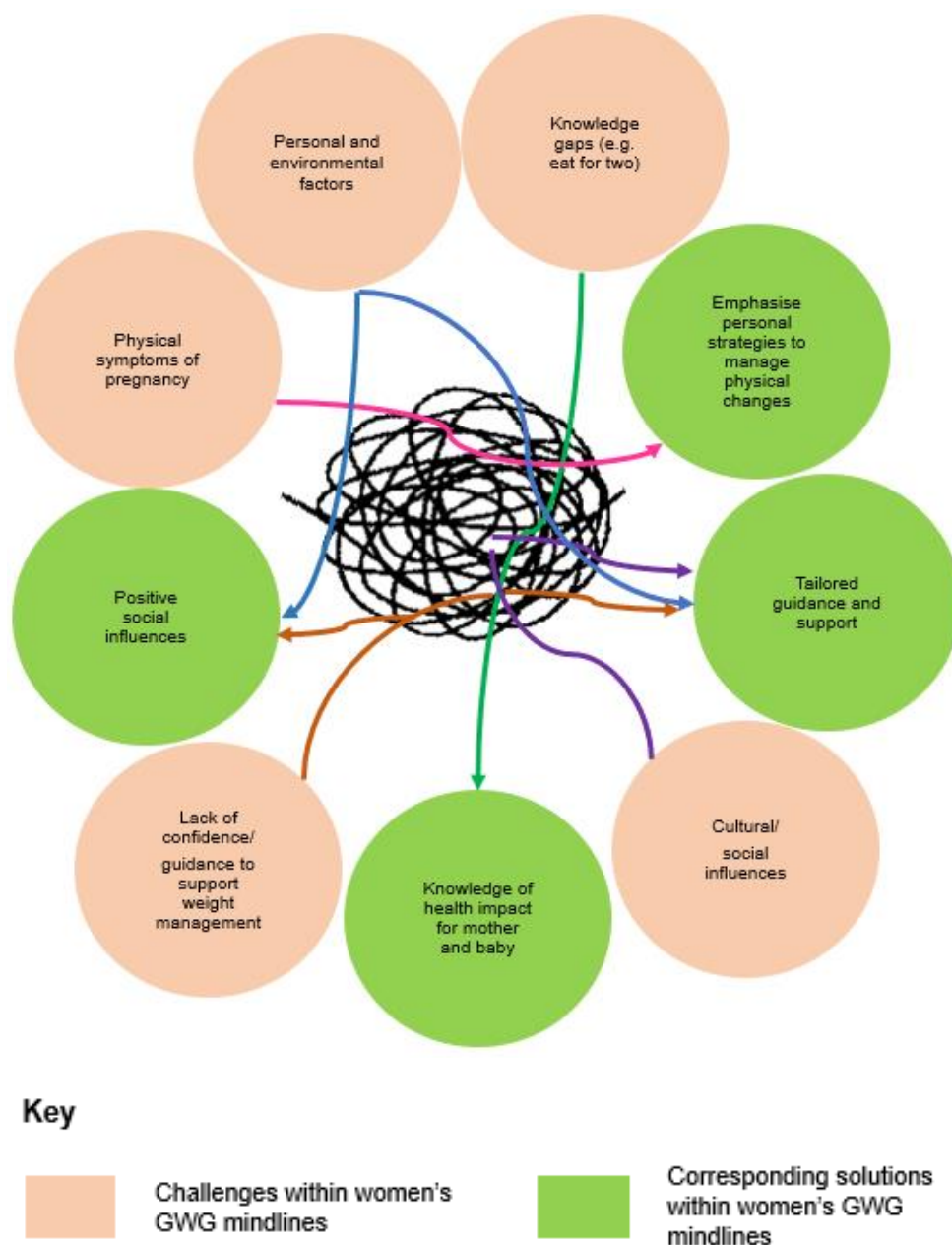


Figure 6.6 presents the arrowed connections between mindline sources in different colours due to the overlap amongst source-based solutions. This captures all data apart from positive changes in physical symptoms, as these were not reported by South Asian women. The personal and environmental factors that permeated women's GWG mindlines may be offset by positive social influences and the provision of tailored guidance and support in navigating the former. Knowledge gaps (such as beliefs in eating for two) could be addressed by emphasising the health impact for the mother and baby. As such, capitalising upon protective maternal instincts may facilitate the enhancement of women's GWG

mindlines. Cultural and social influences (such as advice to consume butter) are similarly counterbalanced by tailored guidance and support from trusted sources, including midwives. In addition, women's lack of confidence or guidance to support effective gestational weight management could be addressed by the positive social influences and tailored guidance and support, which bolstered women's mindlines. Finally, the physical symptoms of pregnancy often dominated women's GWG mindlines and served as a barrier to maintaining a healthy lifestyle. However, personal strategies to manage these may be effective in diluting their influence on women's mindlines.

The prototypes in appendix 30 were subsequently combined within a film for midwives and postcards for midwives and South Asian pregnant women in preparation for the feasibility testing stage. A link to the video and a copy of the postcards can be found in appendix 31. It is anticipated that the postcards for South Asian women are distributed by midwives when the final strategies are developed and implemented after this project. The content of the strategies was informed by the mindline-based challenges and corresponding strategies to enhance mindlines discussed above. Table 6.5 provides an overview of the relevant data that were mapped to the sources that hindered and enhanced midwives' GWG mindlines. Practical judgements were made regarding the most pertinent, emotive quotes to include from the interviews and workshops across each challenge and solution. Table 6.6 provides a corresponding summary for pregnant women (including those who are South Asian), which informed the content of the postcards. Pragmatic decisions were made about which quotes were most pertinent for inclusion on postcards due to the limited space available on these.

**Table 6.5: Corresponding data for mindline-based challenges and strategies to enhance mindlines for midwives**

Examples of mindline-based challenges	Examples of strategies to enhance and amend mindlines
<p><b>Conflicting perceptions of obesity</b></p> <p><i>"I think the issues come with the fact that it's a very sensitive subject...midwives feel a little bit, you know, rude discussing certain things." (M1)</i></p> <p><i>"I think it's a thing that our whole society is...more obese than it was 10, 20 years ago." (M4)</i></p>	<p><b>Evoke midwives' empathy</b></p> <p><i>"I wanted them to talk to me about that, about healthy eating...right from the beginning ...But at the end I got gestational diabetes...So I think that this this thing they should talk to you...right from the beginning..." (P12)</i></p> <p><i>"I think for women it is important, erm, from a psychological perspective as well as a physical one. Erm, especially for first time mums who don't really know what to expect from pregnancy." (M9)</i></p> <p><i>"(A) lot of them do say "Oh we've, we've been trying to lose weight"... and that's from any ethnicity..." (M7)</i></p>
<p><b>Challenges with information and guidance</b></p> <p><i>"(T)here's nothing there that tells us about...healthy eating, healthy lifestyle from a perspective, of...minority ethnic women." (M8)</i></p>	<p><b>Provide midwives with evidence-based guidance and show value of individualised support and combining guidance with other information sources</b></p> <p><i>"So it's highlighting that fact that because it hasn't got the traffic light system, you still need to look at the contents and what's in the ingredients." (M7)</i></p> <p><i>"(W)hat I usually do is see...what type of woman do I have in front of me? What's...her background? What's her understanding? What's her, her initial weight? ... And then erm, asking her if she has any questions about it so she can lead a little bit the conversation of what she feels she needs." (M5)</i></p> <p><i>"It's not always gonna be cake. It can be like salad and vegetables, so it's about <b>moderation</b> rather than...telling a woman to restrict herself..." (M9)</i></p>
<p><b>Varied engagement from women</b></p> <p><i>"(S)ometimes they're not apologetic about that, and don't care, but sometimes they're like "I really want to do something about it". So it really depends on the person." (M2)</i></p>	<p><b>Emphasise personal strategies: highlight the health impact and include family/partners in consultations</b></p> <p><i>"But it's having that knowledge out there...giving the <b>rationale</b> as to why we talk about weight gain and ... if we can do it as a <b>generic</b>, that we say to everybody, <b>even</b> if it's a lady that's got low BMI, you know what I mean." (M7)</i></p>

Examples of mindline-based challenges	Examples of strategies to enhance and amend mindlines
	<p><i>“(I)t takes a community to raise a child. So it's important that we don't just catch the...woman...We need to catch her Aunties, Uncles, Dads, you know Grandmas so that they spread the message properly.” (M7)</i></p> <p><i>“(W)e don't seize that opportunity to impact not just the woman but the impact the family and...maybe coming back at their next pregnancy as a different person,...” (M8)</i></p>
<p><b>Lack of time and resources</b></p> <p><i>“(T)here's so little time to talk about things and there's so many different things that we do need to talk about...” (M9)</i></p>	<p><b>Emphasise personal strategy: combining other tasks with discussions of lifestyle</b></p> <p><i>“(Y)ou can still have those sort of informative...chats...while you're doing other things...or while you're checking their blood pressure or things like that.” (M5)</i></p>

**Table 6.6: Corresponding data for mindline-based challenges and strategies to enhance mindlines for pregnant women/new mothers (including those who are South Asian)**

<b>Examples of mindline-based challenges</b>	<b>Examples of strategies to enhance and amend mindlines</b>
<b>Knowledge gaps (e.g. eat for two)</b>  <i>"I agree with that – "eat for two" for two because, er, end of day you're carrying a human inside you, and you want to see your child after nine months." (P18).</i>	<b>Enhance knowledge of the health impact for mother and baby</b>  <i>"I did overeat, and I gained like 12 KG or something. And, er, I was thinking that all this is actually helping the baby. But at the end I got gestational diabetes." (P12)</i>
<b>Cultural/social influences</b>  <i>"My Mum told me to have milk with <b>butter</b> in it...It just feels like...a <b>huge</b> influx of calories." (P11)</i>  <i>"I was encouraged a lot to just rest. To not do anything." (P20)</i>	<b>Provide tailored guidance and support</b>  <i>"(I)f it comes from my midwife, she's telling me that "OK, this can be too much" or so. Obviously, I I would have listened. I would listen." (P12)</i>
<b>Physical symptoms of pregnancy</b>  <i>"I know I'm having really, like <b>sugary</b> cravings, like all I wanna eat all day is cake and pancakes, and whipped cream, stuff like that." (P11)</i>	<b>Emphasise personal strategies to manage physical changes</b>  <i>"Instead of just going for that biscuit...thinking "Did I really genuinely need that at all,...Is it boredom?" (P15)</i>
<b>Lack of confidence/guidance to support weight management</b>  <i>"Erm, I think that's probably been one of the, the biggest gaps, is kind of, knowing if you are on the right track." (P4)</i>	<b>Draw upon positive social influences and provide tailored guidance and support</b>  <i>"If we were to actually have...group sessions,...then we can have these conversations about...what we should (do)..." (P20)</i>
<b>Personal and environmental factors</b>  <i>"You've got extra-curricular activities and ...then you've got work and then deadlines and then you just, and you're just on the go constantly." (P20)</i>	

## 6.4 Stage 3 – Prototype feasibility testing

The purpose of the final stage was to develop and test the prototypes of the strategies to ensure that the combined knowledge was transformed and could be *internalised* and used by midwives in Birmingham. As discussed at the end of the previous section, the prototypes comprised a film for midwives and postcards for midwives and South Asian pregnant women (appendix 31). Subsequently, interviews were conducted with midwives to evaluate the acceptability of the strategies (Sekhon et al., 2017). This section will begin with a descriptive summary of the midwife participants. This will be followed by an overview of their perspectives of the strategies based upon Framework Analysis (Ritchie and Spencer, 2002).

### 6.4.1 Description of midwives

Five midwives took part in virtual interviews between May and July 2023. The interviews ranged from thirty minutes and fifty-seven seconds to forty-eight minutes and fifteen seconds (median=forty minutes and forty-three seconds). All midwives completed the demographic details form. The majority had over ten years of experience (60%; n=3) and were based in Yorkshire and the Humber (60%; n=3). Two participants (40%) were specialist midwives and two (40%) were based in educational settings. All midwives reported being from White British backgrounds. This suggests that a maximum variation sample was not achieved. Table 6.7 provides a demographic overview of the midwives.

**Table 6.7: Demographic summary of midwives**

<b>Participant number</b>	<b>Ethnic category</b>	<b>Region of Trust</b>	<b>Level of experience in Midwifery</b>	<b>Midwifery setting</b>
M10	White – British	West Midlands	0-5 years	Specialist midwife
M11	White – British	Yorkshire and the Humber	5-10 years	Specialist midwife
M12	White – British	North West England	Over 10 years	Research and commissioning
M13	White – British	Yorkshire and the Humber	Over 10 years	Education
M14	White – British	Yorkshire and the Humber	Over 10 years	University



#### 6.4.2 Midwives' perspectives of acceptability

Midwives' accounts were grouped into the following framework categories: i) perceived benefits, ii) potential drawbacks, and iii) recommended changes. A summary of each of these is provided below.

##### *Perceived benefits*

This category was underpinned by the following themes: i) perceived relevance/usability, ii) valued information/guidance, iii) impetus for advice/signposting, and iv) wider impact. The relevance/usability of the strategies was discussed by all midwives, who reported being able to identify with some of the quotes in the video and postcards. These included myths related to resting during pregnancy, the obesogenic environment as a barrier to women's weight management, and the ability to combine discussions with other tasks. For instance, one midwife reported: *"So things like resting a lot in pregnancy, we do see a lot...you're very precious and you'll, you know, you've got to be kept very safe and not, and not **do** much. And so, I think it's really important to dispel that as a myth."* (M10). In addition, the perceived barriers within the obesogenic environment in the video resonated strongly with some midwives: *"So it's just about getting women to look at the traffic light labels on, on packaged foods and and you see this is one of my bugbears 'cause diet's a real thing for me, for healthy eating. And when you look at the **rubbish** that we're all faced with in the supermarkets..."* (M12). Furthermore, some midwives reported being able to identify with a midwife's suggestion of how to manage time constraints. For example: *"I do agree with "you can completely have these conversations whilst you're doing other things", and I usually do whilst I'm kind of having a feel of the tummy..."* (M11). These examples highlight an agreement with the need for tailored dietary guidance for women from ethnic minority backgrounds, and the ability to navigate time pressures by combining discussions with other tasks. This empathy with the mindline-based challenges and solutions that informed the strategies alludes to some "intervention coherence", which encompasses an understanding of the intervention and how it works (Sekhon et al., 2017).

Some midwives related the relevance/usability of the video and postcards to the empathetic tone: *"You know, the approach was really nice. And, and it's, it's direct, but it's very respectful and very empathetic as well I thought."* (M12). Furthermore, all midwives agreed that they would provide women and colleagues with the postcards. One offered examples of different settings in which they could be used: *"I think in the community, yeah giving out at booking appointments or at antenatal when they're seen in person... Erm, **labour-wise**, kind of intrapartum care,...if they're having an induction that is a long process...Obviously you're still able to revisit that, then use it as an opportunity for health promotion..."* (M10). This

highlights a potential for the strategies to enhance midwives' GWG mindlines across different settings.

Midwives also reflected upon the content of the strategies and reported various aspects of the information/guidance that they found helpful. For instance, one midwife reported finding the video of pregnant women's experiences useful: *"So it's not just necessarily about **her** healthy eating, but it's about extended family members or not getting the right advice. Erm, so we can see that er, kind of across the board that it's, you know where we need to target."* (M10). This account infers an intention to engage the family in consultations with South Asian women. A family-centred approach was similarly adopted by some midwives in the literature review and endorsed by a minority who were interviewed. Therefore, this emerged as a mindline-based solution to women's varied engagement (table 6.3). Additionally, the account indicates that empathy for wider social influences was evoked and could provide a solution to midwives' conflicting perceptions of obesity. Some midwives reported learning about the availability of the South Asian Eatwell Guide (Jay, 2021). Examples of these include: *"I really liked the Eatwell plate applicable to South Asian people because I thought that was really, really important, which I didn't **know** was a, was a **thing**. So I'll definitely take that forward as well."* (M11) and: *"I also liked your food triangle, the plate - I've never seen that one before and I've only ever seen the generic one..."* (M14). This suggests that valuable knowledge was acquired in relation to tailored food guidance to support women from this background. Furthermore, these accounts indicate some benefit in using wider information sources as a mindline-based solution to midwives' challenges with information and guidance. Therefore, the combined knowledge within the strategies held promise in its capacity to be transformed and internalised by other midwives. As a consequence, it is possible for the strategies to enhance midwives' GWG mindlines and readiness to advise women.

Midwives also reported on perceived effectiveness of the strategies in supporting midwives to discuss weight, or signpost women to further resources. All agreed that the postcards for women could serve as a conversation starter for discussions about weight. One example of this revealed: *"I think it's gonna give the midwives the, the confidence to broach these subjects. If you know a little bit more about it, you can address it if you're, I think it's that awareness of what the family's telling the women 'cause the women aren't in a vacuum."* (M12). Another midwife reflected upon how the strategies could help to shift how women regard midwives: *"As I said, we can appear very dictatorship - "Congratulations, you're pregnant. No caffeine, no fat foods, no homemade mayonnaise." So all of a sudden we come from, can be the **nice, lovely** person."* (M14). This indicates a perceived emphasis on

risk avoidance within midwifery that challenged midwives' GWG mindlines in the interviews and co-design workshops. One midwife highlighted assurance that the postcards could support colleagues with signposting: *"If they're being asked a random question about kind of weight management and stuff, they've got them links straight on the back."* (M11). Thus, the postcards were regarded as effective in enabling discussions about weight management with women and addressing the breadth of their concerns.

Midwives also described several wider benefits of the strategies that extended beyond their assistance with advising and supporting South Asian women with their weight. For example, some midwives anticipated that the postcards could benefit women from different groups or all ethnic backgrounds: *"I think it could benefit women of **any** background, to be honest. The same principles could be applied, couldn't it?"* (M12). In addition, the potential influence on midwives' lifestyle behaviours was highlighted by one midwife: *"And I think not just kind of, it might make them [midwives] look, re-evaluate **their** eating habits as well. And it might make them look at how much exercise they do."* (M11). This extract broadly aligns with the influence that midwives' body image sometimes held on their GWG mindlines and confidence in advising women about weight in the literature review and interviews. Several midwives also described a potential to support partners or the family. One example illustrated: *"There may be pregnant women coming, but what about her relatives, her sister, her mother? It may just get them going, may make them think about their own diet as well."* (M13). This account conveys a potential to enhance the mindlines of women and their families in the long-term. Indeed, a family-centred approach was similarly adopted by some midwives in the literature review and endorsed by a small number in the interviews and co-design workshops. Overall, midwives reported positive components of the strategies regarding their relevance, ability to support discussions about weight, and potential to influence women and their families. This suggests that the strategies were regarded as acceptable, and that the knowledge within these could be internalised and used by other midwives. Therefore, the potential to enhance their GWG mindlines and readiness to advise South Asian women about weight is promising.

#### *Potential drawbacks*

Midwives' descriptions also revealed their consideration of potential challenges when using the strategies in practice. These were related to time, midwives' context, and women's needs. Several midwives' concerns about time were apparent when they reflected upon the use of the video. For example, one midwife clarified: *"I think it's a little bit **long**. Erm because I think it would need to be combined with someone talking **about it** and kind of discussing different things..."* (M11). Other midwives voiced concerns about the need for protected time

to watch the video: ***But** you could still have watched it previously if you've had protective, protected time for, for training is really important and that's something that we fall down on a lot is the **protected time** is the key thing.*" (M12). These reports align with the theme regarding midwives' anxieties about time within the literature reviews, interviews, and co-design workshops.

Limitations with midwives' context were related to their attitudes, confidence, and perceived relevance. For example, some midwives cited the attitudes and confidence of other midwives as potential barriers to using the strategies in practice. One midwife reported that staff engagement may be influenced by their willingness to acquire further knowledge about supporting South Asian pregnant women with their weight: *"Erm, I think with the video, and like with the postcard for the midwives...you're gonna get the people who **want** to engage...the people who are caring for, erm, women of kind of South Asian descent regularly..."* (M10). Another midwife noted that the strategies may be less acceptable to those who lack confidence: *"It's gonna be those midwives who are maybe not **confident** or uncomfortable. They're the ones that are just maybe gonna give them a leaflet and then just shy away from talking about it..."* (M11). Consequently, the attitudes and confidence of midwives were highlighted as potential barriers to enhancing their mindlines and thus supporting them to advise women about weight management. Similarly, some midwives' attitudes also served as a hindrance to effective support in the literature review, whilst a lack of confidence in providing advice about weight was reported in the literature review and interviews.

Perceived relevance to midwives' context was also regarded as a potential drawback of the strategies. One midwife reported that the postcard and video would be less relevant for a midwife working on a labour ward: *"She's not gonna be focused on the diet, she's gonna be focusing on getting getting a live baby out...It's mainly gonna be focused for the community."* (M13). She also reported that the SMART objectives may not be appropriate for engaging midwives: *"The SMART thing. I wasn't too, that's a bit off-putting cause it looks like too much management leadership type thing."* These examples highlight the importance of evoking shared understandings to ensure that the strategies enhance midwives' mindlines.

Another limitation reported by a minority of midwives related to women's needs when accessing the postcards. These included their reactions and the potential impact on women's home lives. For example, one midwife reported a sense of inevitability that some women may take offence or choose to disregard the information: *"Erm, I think, that you're always going to have people who will be offended, and I think it's **how** that resource is*

*introduced, to the level of how it would offend someone.*" (M11). The importance of sensitivity when introducing the topic of weight was also underlined by some midwives in the literature review and interviews, who reported adapting advice to women's needs. Another midwife highlighted the possibility that women's relationships with family members may be adversely affected: *"It could obviously cause some issues at home because if we're saying to ladies to change their diet, they've had that diet for their entire life, so it it **may** cause issues, family issues..."* (M14). This reinforces midwives' empathy for the social influences that shaped women's GWG mindlines across the reviews, interviews, and co-design workshops. As such, acceptability to women was an important area of consideration for midwives as they considered potential barriers to engagement. In summary, midwives reported some drawbacks of the strategies that may negate their acceptability and potential impact in influencing other midwives' GWG mindlines. These allude to aspects of the combined knowledge that may not be amenable to transformation and internalisation.

### *Recommended changes*

Midwives provided several suggestions of how the strategies could be developed further. These were linked with: i) information/guidance, ii) tailoring, and iii) format. Recommendations for information/guidance included having more specific advice on which foods women should and should not eat and guidance on other health behaviours such as smoking, alcohol, and breastfeeding. For example, one midwife reported: *"Erm, I think it would be good if it [postcard] could go as far as to give the advice on specifically, like what, what to, and to not eat. But again that's, that would then become a whole kind of appointment in itself."* (M10). The need to include other health behaviours amongst some midwives is illustrated in the following extract: *"I'd add in if they smoked at all - that can impact. I'd add any alcohol - that aspect of it as well..."* (M13). These suggestions accentuate midwives' need for trusted sources of guidance to support women with their weight, which was apparent in the literature review and interviews. They also reinforce the potential for wider information resources to enhance midwives' mindlines and the acceptability of the strategies.

Midwives also voiced a need for further tailoring. For instance, several recommended providing the postcard for women in different languages and tailoring them to different ethnic groups. These are exemplified as follows: *"Will the postcards and the video be subtitled in various languages?... Then it's, it's includes, inclusive for everybody, really, I suppose."* (M14) and: *"And I think I'd probably like to see it for other countries as well, such as Mediterranean and Caribbean."* (M13). Another midwife suggested adapting the strategies to different maternity providers: *"I think it just needs to be tailored to, if you're using it in*

*different Trusts, I think it's just having that conversation with them, midwives on how it **may** need to be tailored to that Trust."* (M11). Midwives therefore conveyed an understanding of wider contextual factors of ethnic variations in the local population and nuances in local practice, which served as important areas to address to ensure acceptability.

Midwives made several suggestions surrounding the format of the video and postcards. For instance, one midwife recommended having a virtual postcard to ensure prompt access to the resources on the reverse: *"Erm, so if it was like a...**virtual** postcard they were given...you could just literally scan it on your phone, it would bring it [links to resources on reverse] straight up. **That** might be helpful."* (M10). Another endorsed the value of filming an individual providing the pregnant woman's summary at the start of the video: *"Erm, and the first bit where the, the individual's talking about her own experience is **really good** and really insightful, but it might be good if we get someone to actually speak it themselves, so if that individual would be willing to actually be filmed ..."* (M11). This reinforces the value of evoking midwives' empathy to address their conflicting perceptions of obesity. Another proposal about format comprised the development of an app for the video and postcards: *"I just think it's really good, really good ideas and I think it'd be great if you could get an app developed with it."* (M13) and playing cards that display the postcards: *"Playing cards, physical playing card. You could do it like that. The size of a playing card."* (M13).

Overall, midwives regarded the strategies as acceptable and coherent with their understanding of consultations in relation to weight gain. The strategies were also considered as effective in supporting midwives to advise and signpost about weight with South Asian pregnant women. Moreover, midwives anticipated wider benefits of the strategies being used to influence partners, the family, and other midwives' health behaviours. However, areas of burden were reported in relation to time, midwives' context, and women's needs. Notably, however, midwives' accounts of the strategies in relation to current practice often aligned with findings from the literature reviews, interviews, and/or co-design workshops. In particular, midwives' reported lack of time and need for tailored guidance to support women with their weight were reinforced. In addition, they confirmed the value of the following mindline-based solutions: i) evoke empathy, ii) emphasise personal strategy to combine other tasks with discussions of lifestyle, iii) highlight the value of including family/partners in consultations, and iv) accentuate the need for individualised support. This suggests that overall, the combined knowledge within the strategies was transformed and could be internalised and used by other midwives. This highlights a clear potential to enhance their GWG mindlines and preparation to have culturally sensitive consultations about weight with South Asian pregnant women.

## Chapter 7 Discussion

### 7.1 Introduction

This aim of this study was to co-design strategies to enhance midwives' GWG mindlines in relation to South Asian women. This would foster their readiness to have culturally sensitive consultations in relation to GWG with this group. This was particularly important due to evidence for the risks associated with excessive GWG to mother and baby. As discussed previously, cultural safety can help to address ethnic inequities in health. Having conducted interviews and co-design workshops with South Asian pregnant women, new mothers and midwives, prototype strategies were developed and refined to support midwives to have such consultations. The acceptability of these was then evaluated through a series of interviews with midwives. This chapter will begin with a summary of the main findings from this study. Subsequently, these will be contextualised in relation to broader research surrounding: i) diverging weight narratives, ii) maternity service provision for women from ethnic minority backgrounds, and iii) mindlines as a conceptual framework to support KMb. This will be followed by an overview of strengths and limitations of the study and recommendations for research, policy, and practice. Finally, overarching conclusions will be presented to summarise the study's contribution to knowledge.

### 7.2 Summary of findings

The **Stage 1** interviews highlighted that pregnant women's GWG mindlines were informed by their need for trusted guidance and varied levels of midwifery support, which ranged from a lack of discussion about weight to practical guidance on PA, nutrition, and weight monitoring. Some South Asian women described a need for assistance with their weight from midwives at an earlier stage of pregnancy as a result of health concerns connected with their weight. In some instances, women's protective values regarding their health and that of the baby led to misunderstandings that eating more would benefit the baby or concerns about the safety of PA. Whilst all women's mindlines were challenged and enhanced by social influences, these were particularly dominant for South Asian women and largely served to hinder their weight management. In addition, physiological changes pervaded the GWG mindlines of women from all ethnic backgrounds. Notably, however, South Asian women did not report beneficial physiological changes. This suggests that their mindlines were challenged by feelings of physical discomfort, which created a stronger barrier to nutrition and PA.

Midwives' mindlines were similarly influenced by: i) a need for further information to inform their consultations and ii) perceived engagement from women. On some occasions, they encountered feelings of frustration with the dietary behaviours of South Asian women.

Midwives' mindlines were also challenged by their conflicting perceptions of obesity and lack of time and resources. However, these were offset by their personal strategies and feelings of empathy that stemmed from the protective values and social and environmental influences that guided women's mindlines. These highlighted a potential to enhance midwives' mindlines. Overall, women and midwives' GWG mindlines developed through a negotiation of experiential and codified knowledge, which presented challenges and facilitators of their lifestyle behaviours and practice.

The literature review and Stage 1 findings were subsequently used to inform the planning of the Stage 2 workshops. Firstly, they were synthesised and used to develop two films, which summarised the experiences of pregnant women and midwives. Secondly, evidence in relation to effective weight management techniques during pregnancy (acquired from the literature reviews and wider reading) was included within a quiz.

In the **Stage 2** co-design workshops, the group confirmed the digital stories largely resonated with their understanding of GWG. Discussions of the research evidence within the quiz revealed a blending of the above with practical knowledge regarding nutrition, exercise, and sleep within co-designers' mindlines. Discussions of good and bad experiences of consultations highlighted a need for: i) culturally tailored nutritional guidance for women from all ethnic backgrounds, ii) effective communication strategies, and iii) the provision of advice in early pregnancy. These preferences confirmed previous evidence from the literature reviews and interviews. Co-designers also advocated a preventative, holistic, and pro-active approach to supporting women that included targeting women in the community as well as their social networks. The group's preferred ideas of how to influence midwives to have culturally sensitive consultations were: i) provide a 15-minute talk on the topic at annual mandatory training day for midwives and ii) develop a brief education package for newly qualified midwives. These were developed as a film for midwives and postcards for midwives and South Asian pregnant women in preparation for feasibility testing. The content of these were derived from the mindline-based challenges and corresponding solutions across the literature reviews, interviews, and co-design workshops. As such, the strategies drew upon the "*contextually adroit*" (Gabbay and le May, 2011: 90) knowledge of midwives and South Asian pregnant women. That is, they aligned with the context-specific knowledge within their mindlines.

In the **Stage 3** feasibility testing stage, midwives regarded the strategies as acceptable and effective in supporting others to advise and signpost about weight with South Asian women. Midwives recognised several mindline-based challenges and agreed with solutions that



informed the strategies. However, potential areas of burden in relation to time, midwives' context, and women's needs were identified. Their suggestions for strategy development concerned: i) information/guidance, ii) tailoring, and iii) format. Despite this, midwives anticipated wider benefits of the strategies suggested, such as a positive influence on the health behaviours of partners and families. This indicates that the combined knowledge within the strategies was transformed and could be internalised and used by other midwives. Therefore, the strategies could help to enhance their GWG mindlines and readiness to have culturally sensitive consultations about weight with South Asian pregnant women.

### **7.3 Situating the study within broader contexts**

The findings of this study have been situated within the broader empirical and theoretical literature concerning: i) diverging social narratives about weight, ii) maternity service provision for women from ethnic minority backgrounds, and iii) mindlines as a conceptual framework.

#### **7.3.1 Diverging social narratives about weight**

This section will provide an overview of the three main themes within women and midwives' reports of weight: i) the obesogenic environment, ii) normalisation of obesity, and iii) the stigmatisation of individuals with obesity. The term "obesogenic environment" refers to the combined influence of an individual's environment and opportunities in promoting obesity (Swinburn et al., 1999). Examples of environmental obesogens include close proximity to fast-food outlets and reduced access to green spaces. In this study, some midwives and women referred to the obesogenic environment. A summary of their concerns is provided below.

Some women (including those from a South Asian background) voiced concerns about the accessibility of healthy foods in light of cost and perceptions of reduced convenience in comparison with fast food. The reported cost of healthy food is particularly pertinent, since the average price of fruit and vegetables in the UK in 2022 was over twice as high as that of foods high in sugar, fat and/or salt (£10.56 per 1,000 calories compared with £4.50) (Goudie and Hughes, 2022). Furthermore, the cost of healthy foods has been described as a barrier to healthy eating amongst some pregnant women from ethnic minority backgrounds (chapter 3). Additionally, financial barriers to healthy eating may be more prevalent in Birmingham, since 40% (n=254) of lower super output areas are in the most deprived decile for income deprivation (relating to low income) (Ministry of Housing Communities & Local Government, 2019).

Midwives in this study expressed concerns about societal attitudes that may normalise obesity. They cited the growing prevalence of obesity in the population, as well as fears that the raised BMI and eating habits of other health professionals (including midwives) may hinder their support of pregnant women with gestational weight management. The concept of obesity as a normalised phenomenon refers to a raised threshold for perceptions of obesity as a result of observing the increasing prevalence of obesity in the population (Robinson, 2017). In England, the prevalence of obesity has increased from 13% of men and 16% of women in 1993, to 27% of men and 29% of women in 2019 (NHS Digital, 2022). Thus, midwives' reports on the societal pervasiveness of obesity are reflected in national data. In addition, some South Asian women alluded to family expectations to gain more weight when describing advice to consume butter, and preferences for larger babies. Similarly, a Canadian study highlighted that pregnant women often over-estimated how much weight they should gain in comparison with the IOM recommendations (2009) (Moffat et al., 2021). Moreover, this arose significantly more frequently amongst women from ethnic minority than White backgrounds. However, this study identified that many women also worried about gaining excessive GWG. In the present study, a cultural preference for larger babies was shared by one South Asian woman. This suggests an idealisation of high body weights within South Asian cultures, which may be linked with perceived connections between a larger body size and health (Bush et al., 2001).

Additionally, many midwives related the sensitivity of discussing weight to societal stigma. Obesity stigma comprises stereotyping and discriminatory attitudes and actions towards individuals with a larger body size and is often triggered by insufficient knowledge about the causes of obesity (Puhl and Heuer, 2010). For instance, the assumption that obesity is largely caused by a poor diet and lack of physical activity remains prevalent across the media and scientific literature (Chaput et al., 2014), and overlooks the multifaceted nature of weight management. In the current study, pregnant women did not explicitly report stigmatising behaviour from their midwives. However, some women's reports of weight not being discussed by midwives are indicative of the perceived stigma of this topic. Importantly, weight stigma remains a critical issue that is associated with several adverse outcomes across the population. These include an increased risk of poorer mental health including depressive symptoms, anxiety, and body image dissatisfaction (Emmer et al., 2020). There is also evidence that individuals who experience obesity stigma tend to exclude themselves from public settings such as gyms and swimming pools (Thedinga et al., 2021).

Midwives in the current study often reported discomfort in discussing weight with women if they were also overweight. Similarly, a national survey of pre-registered nurses and midwives revealed that a lower BMI was linked with significantly higher levels of confidence

in providing dietary advice (Blake et al., 2021). This suggests that midwives' own views and experiences of obesity are highly prominent sources of influence on their GWG mindlines and confidence in providing advice. This aligns with the concept of weight bias internalisation (WBI), which refers to self-directed weight stigma in which negative attitudes due to weight status are applied to oneself (Pearl and Puhl, 2018). WBI has been linked with increased levels of perceived stress and engagement in eating as a coping strategy (Pearl et al., 2020; Pearl et al., 2021). Furthermore, WBI is positively associated with weight gain and weight cycling (repeatedly losing and gaining weight) (Pearl et al., 2020) and higher rates of withdrawal amongst individuals attending weight management clinics (Verhaak et al., 2022).

In the present study, pregnant women's reports did not overtly indicate WBI. However, several attached critical judgements to their eating habits and level of engagement in PA such as "*terrible*" or "*guilty*". Women's judgement of their lifestyle behaviours may have been perpetuated by a wealth of messages about weight during pregnancy in the media. For instance, in a UK analysis of 442 newspaper articles, women with obesity during pregnancy were consistently framed with messages inferring blame and burden to society and the NHS (Heslehurst et al., 2022). Furthermore, the media has been cited as the most common source of weight stigma by women compared with others such as community members or healthcare providers (Incollingo Rodriguez et al., 2020).

The need to address weight stigma within education, healthcare, government, and the media has been emphasised (Chadwick et al., 2019; Rubino et al., 2020), particularly as obesity is linked with multiple factors such as immune function, genetics, and social and cultural factors (Fitch and Bays, 2022). Similarly, excessive GWG is associated with economic, social, cultural, and environmental influences as well as those that are individual. Thus, the influence of women's living conditions should be considered alongside their lifestyle behaviours. This accentuates the need to ensure that maternity services are tailored to the needs and preferences of women from ethnic minority backgrounds. A discussion of this will be provided hereafter.

### **7.3.2 Maternity service provision for women from ethnic minority groups**

The importance of woman-centred care that is personalised, compassionate, and enables informed decision-making has been emphasised in national policy to support maternity services (NICE, 2021; Royal College of Midwives, 2022). Despite this, there is national evidence that women from ethnic minority backgrounds experience greater challenges with: i) access to information, ii) person-centred support, and iii) maternal health outcomes in

maternity care. Access to information and communication was a pertinent theme in this study. Many women from different ethnic backgrounds voiced a need for further communication about weight from midwives and trusted sources of guidance to support gestational weight management. Similarly, some midwives described a need for more tailored food guidance to support their advice for women from ethnic minority backgrounds. Recent studies with women from ethnic minority backgrounds in the UK indicate mixed findings regarding their perceived access to information from maternity healthcare professionals. For instance, women have reported a lack of communication about medications and tests during pregnancy (Konje and Konje, 2021) and an absence of or inconsistent information about antenatal classes (Thomson et al., 2022). However, other studies have revealed positive experiences of communication and improved access to information as a result of trusting relationships with midwives (Arrowsmith et al., 2022; Birthrights and Birth Companions, 2019). It should be noted that the latter studies explored the views of comparatively smaller samples of women (n=10 and n=4 respectively). Nevertheless, their use of qualitative approaches enabled sufficient flexibility in capturing the experiences of women (Tuckerman et al., 2020). Additionally, some South Asian women in the present study voiced a preference for support with weight at an earlier stage of pregnancy, which highlights communication gaps. This mirrors expectations to see a midwife more often in the early stages of pregnancy amongst some women from ethnic minority backgrounds (Khan, 2021).

The need for improved access to information and effective communication was also underlined in the present study when a midwife referred to translation from partners and the challenges of communicating clinical information to women through this route. This aligns with wider evidence that women have been required to seek help from family (Rayment-Jones et al., 2021; Thomson et al., 2022) and community members (Konje and Konje, 2021) with translation. Overall, women's experiences of interpreting services in maternity care have ranged from an absence of or challenges in accessing these (Konje and Konje, 2021; Rayment-Jones et al., 2021; Thomson et al., 2022), to poor quality or experiences of interpretation (Rayment-Jones et al., 2021), and some effective communication being facilitated by them (Thomson et al., 2022).

The importance of person-centred support was another central theme within the provision of maternity services. Unlike women from other ethnic groups, some South Asian women in this study described difficulties in contending with family advice to engage in less physical activity. Furthermore, several women from this background experienced forceful dietary advice from family members. This alludes to the prominence of the family unit in South Asian

women's experiences of GWG and suggests that these women required person-centred support that moderated the dominance of family advice. Several midwives acknowledged the influence of the family unit and advocated the inclusion of families or partners in consultations to provide effective support for women from all backgrounds. This reveals contextual understanding of the factors that influence women's weight management. However, previous studies highlight mixed findings concerning the extent to which maternity care is tailored to the needs of women from ethnic minority backgrounds. For instance, some asylum-seekers have described an emphasis on routine checks and a lack of person-centred support from midwives (Birthrights and Birth Companions, 2019). Conversely, in small qualitative studies, women from ethnic minority backgrounds have reported perceptions of holistic support as a result of continuity of midwifery care (John et al., 2021).

In the present study, women's overall perceptions of midwifery support did not differ by ethnicity. Instead, they often reported varied levels of advice about their weight across the different midwives they encountered. However, previous reviews of women's experiences of maternity care have identified that those from ethnic minority backgrounds regard their care more negatively and report direct discrimination or being supported in less helpful ways compared with White women (Drake et al., 2022; Kapadia et al., 2022; MacLellan et al., 2022). Additionally, a recent maternity survey revealed that women describing their ethnicity as "multiple ethnic groups" (including White and Black Caribbean or African, and White and Asian amongst others) were less likely to report personalised support and being treated with kindness and understanding across antenatal care, labour, and birth (Care Quality Commission, 2023). As such, the need for culturally sensitive maternity care is vital. In the present study, perspectives of midwifery support were often connected with perceptions of midwives' workload. Women from different ethnic backgrounds perceived midwives may lack sufficient time to provide comprehensive support. This was reflected in a recent review in which women from ethnic minority backgrounds frequently described a perceived lack of time amongst maternity professionals to signpost to information (MacLellan et al., 2022)

Some South Asian women in the current study reported health conditions that developed as a consequence of their GWG. This is particularly concerning considering national evidence for ethnic inequities in maternal health outcomes. Recent data for 2018-2020 revealed that those recorded as Black were 3.7 times and Asian 1.8 times more likely to die than White women during pregnancy (Knight et al., 2022). In addition, half the women who died from hypertensive disorders of pregnancy were Black or Asian (Knight et al., 2022). The need to address ethnic disparities in maternity care across England has been repeatedly documented (Department of Health & Social Care, 2022; NHS England and NHS

Improvement, 2021; Public Health England, 2020b). Notably, maternity systems are encouraged to include the voices of individuals from ethnic minority groups when developing an understanding of local maternal and perinatal health needs (NHS England and NHS Improvement, 2021). The present study has integrated the perspectives of women from South Asian and other ethnic backgrounds alongside those of midwives. This has helped to inform the co-design of strategies to support midwives' consultations in relation to weight gain with South Asian women. In particular, the mindlines model provided a valuable framework for fusing practical knowledge with research evidence. The following section will provide a summary of the application of mindlines in comparison with other studies to influence clinical practice.

### **7.3.3 Mindlines as a conceptual framework to support KMb**

There is a growing body of literature in relation to amending and enhancing mindlines in clinical practice. Furthermore, previous studies have demonstrated success in enhancing mindlines. This section situates the present study within the context of others that have applied the mindlines model to clinical practice. In the present study, interviews were conducted alongside midwives and pregnant women to understand how their GWG mindlines developed. Additionally, co-design was used to combine the practical understanding of women and midwives with research evidence and guidance. Co-design has similarly been used to understand ideal consultations and priorities for mindline amendment with eczema when working alongside parents of children with atopic eczema and practitioners (Cowdell et al., 2020). Like the current study, a thorough understanding was acquired of how lay and practitioner mindlines developed, which informed discussions of how patients and practitioners can be best supported. This was then used to inform the design of several resources including an animation, teacher resource pack, and postcards (Cowdell, 2023). The present study also integrated shared understandings within postcards to convey key messages that were derived from the mindline-based challenges and solutions for both groups across the literature reviews, interviews, and co-design workshops.

In the current study, storytelling was one strategy utilised for mindline amendment amongst women and midwives. Similarly, storytelling was one element of a forum theatre event designed to enhance understanding of the psychological impact of injury among patients and practitioners (Beckett et al., 2023). Here, three forms of evidence (namely patient, practitioner, and research findings) were combined within forum theatre, which involves the creation of a play about a social issue and encourages the audience to explore alternative options for characters (Boal et al., 1979). This was followed by workshops with patients,

practitioners, and researchers and an analysis of the study outcomes. Conversely, the present study entailed the creation of separate digital stories of women and midwives' experiences.

Another strategy to alter mindlines has involved the use of "mindlines-producing conversations" to improve diabetes control amongst General Practitioners (Epling et al., 2021). For example, practices considered whether evidence is accepted or adapted to the context, which helped to strengthen practitioners' mindlines related to EBP. The findings revealed that diabetes control improved at the four practices. In the present study, women as well as midwives were involved in discussions of research evidence. In addition, this took place alongside the quiz to ensure that this was combined with co-designers' practical knowledge and used to inform the content of the strategies.

Overall, the application of mindlines in the present study shared some similarities with previous research but was unique in its techniques to mobilise different forms of knowledge (i.e. research evidence, guidance, and participants' practical understanding). These disparate sources of evidence were captured within the literature reviews and interviews before being combined within digital stories and a quiz for the co-design workshops. Finally, the evidence within the stories and quiz was integrated with the practical knowledge of co-designers and embodied within the strategies. This process has the potential to help to transform and unify diverse knowledge regarding GWG from multiple points in time and space. Mindlines similarly combine a wealth of knowledge within a single moment to generate actionable forms of knowing. As a result, the potential for the final strategies to enhance midwives' GWG mindlines is strengthened.

### **The journey of my thinking as a researcher on mindlines**

My initial approach to applying the mindlines model reflected an attempt to tame the intricacy of mindlines and rationalise a complexity that unnerved me. I found comfort in using the SECI spiral as a foundation for the structure of my study. However, it became clear that the process of mindline development is far messier and often opposes a linear sequence. For instance, when planning the study, it was apparent that externalisation and combination may need to take place repeatedly before internalisation can arise. Furthermore, it is possible that the stages of socialisation, externalisation and combination are concurrently active when internalisation is taking place. Towards the end of the study, I also came to regard the mindline sources as inextricably bound – colliding yet fusing in their ultimate influence upon actions. As such, my thinking as a researcher on mindlines evolved considerably during the study and shifted towards a greater understanding of their multi-faceted routes of development. Further work is now needed to refine the strategies and evaluate their value for midwives and South Asian women in practice.

## 7.4 Strengths and Limitations

The strengths of this study include its focus on an under researched area and use of a relatively new theoretical approach. Each of these is discussed hereafter. This study contributes towards improving the representation of women in research (NIHR, 2022) and addresses a clearly identified gap in strategies to support the maternal health of women from ethnic minority backgrounds (Esan et al., 2022). Moreover, the present study placed an emphasis on midwives' consultations with South Asian women, who have a markedly greater risk of gestational diabetes compared with White women, which can be reduced through management of GWG.

The objective to enhance midwives' readiness to support South Asian women with their weight was facilitated by the use of KMb, since the sharing of knowledge amongst midwives, South Asian pregnant women, and new mothers was a crucial catalyst to provision of EBP. It has long been accepted that EBP requires integration of research evidence with clinical expertise and patient preferences (Sackett et al., 1996). This was aided by a rigorous synthesis of evidence across each research stage and the use of novel methods of mobilising knowledge. For instance, the findings from four systematic literature reviews were combined with results from the interviews before digital stories were created to summarise the experiences of midwives and pregnant women. In addition, the findings from the reviews, interviews, and co-design workshops were synthesised and used to inform the content of the strategies.

The use of a qualitative, exploratory approach to this study enabled sufficient depth in examining the wealth of sources that shaped women and midwives' mindlines, whilst allowing breadth of analysis through largely inductive techniques. As part of the co-design workshops, extensive efforts were made to ensure shared power and the inclusion of all perspectives (Hickey et al., 2021). These were supported using three facilitators and different methods to share feedback amongst co-designers.

There are a paucity of studies that have used co-design with health professionals to enhance their support of patients' weight management (Yazdizadeh et al., 2021). It has also been noted that women's views should be used to inform the design of training and resources to support conversations about GWG (Olander et al., 2021). In this study, co-design with South Asian women and midwives provided a social context through which shared understandings of research and experiential evidence could be fostered. Consequently, this helped to unify evidence from different stages in time and place, thereby



aligning with the process through which midwives' mindlines evolve and increasing the potential to enhance them.

This is the first study to apply mindlines theory in the field of midwifery. The mindlines model provided a novel, pertinent foundation for exploring and synthesising different sources of knowledge. This facilitated an important insight into social and cultural influences on lay and practitioner mindlines. As such, this study provides a unique contribution to knowledge regarding the social and cultural aspects of women and midwives' mindlines. Furthermore, interventions to amend and enhance mindlines offer a promising approach to changing practice. Indeed, the perceived acceptability of the strategies in Stage 3 suggests that midwives' GWG mindlines can be enhanced through strategies that embody the combined knowledge held within these. This study also contributes towards literature concerning health inequalities through its emphasis on the challenges, facilitators, and preferences regarding support with GWG amongst South Asian women and those from other ethnic minority backgrounds.

Since this study began at the start of the COVID-19 pandemic, it provides an additional insight into women's experiences of gestational weight management and midwives' support of this during this period. Additionally, the use of virtual co-design required careful consideration of how to enhance inclusivity and the collective engagement of co-designers (Langley et al., 2021b). However, this method has benefits related to: i) sustainability by reducing costs related to travel (Zhang et al., 2022) and ii) the potential to reduce power dynamics by providing a view into others' lives and homes (Fails et al., 2022). As previously noted, co-designers were provided with novel methods of sharing feedback. Despite these opportunities, the pandemic may have exacerbated challenges with recruiting participants, which are discussed below.

The interviews were not exclusively with South Asian women despite extensive recruitment efforts. Similarly, attendance by this group at co-design workshops was limited. Although midwives were recruited to the study, numbers were not as high as anticipated. This may be due to the workload pressure, particularly during the pandemic (Jones et al., 2022; McGrory et al., 2022). Therefore, a limitation of the co-design workshops relates to the small number of women and midwives who attended. However, each workshop generated rich discussions that may have been supported by the approachability of a small group. Furthermore, I developed a considerable understanding of the practical application of research methods when holding the interviews and workshops. Key learning included the value of listening, establishing a rapport, and being flexible to changes in plans. The latter became apparent

when I considered which tools to use to support the sharing of experiences in the workshops (such as a sharing board in Microsoft Teams). However, it became apparent that conversations were more suitable due to the small numbers.

Another potential limitation of the study relates to the format of the strategies. Co-designers expressed a preference for: i) a brief talk on the topic at the annual mandatory training day and ii) an education package for midwives. However, there is evidence that information and guidelines alone are insufficient in influencing clinical practice (Gabbay and le May, 2004), which was in tension with the need to remain faithful to the principles of co-design (Hickey et al., 2021). The suggested intervention was developed to include more extensive modes of delivery to influence midwives' mindlines and enhance shared understanding between women and midwives.

## **7.5 Recommendations for research, policy, and practice**

### **7.5.1 Recommendations for research**

In relation to this study, future research should include: i) further development and feasibility testing of mindline enhancement strategies and ii) assessing their efficacy in supporting midwifery practice. Additionally, future research should include an exploration of how mindlines theory can be used more widely to improve healthcare. This could involve developing a greater understanding of how collective mindlines can be addressed. Finally, there is a need to ensure inclusivity in research by including under-served groups such as pregnant women (NIHR, 2022).

### **7.5.2 Recommendations for policy and practice**

The need for national guidance in relation to how much weight women should gain during pregnancy was voiced by many women and midwives in this study. This also been advocated by the Royal College of Midwives (2018) following surveys with expectant women and midwives. As such, clear guidance to support gestational weight management and midwives' consultations is required. In addition, the development of health conditions linked with excessive GWG amongst some South Asian women points to the need for Asian-specific BMI criteria (World Health Organisation expert consultation, 2004) in antenatal settings.

National policy should also seek to address the environmental barriers to PA and nutrition identified by women by providing more safe, affordable spaces to exercise and addressing the cost of healthy food. Concerns about the obesogenic environment were also voiced by

midwives, and have been mirrored in recent reviews such as the National Food Strategy (Dimbleby, 2020; 2021) and Improving access to greenspace (Public Health England, 2020a). Some midwives in the current study noted that national guidance on the provision of antenatal weight management advice (NICE, 2010) emphasises the avoidance of risk rather than the promotion of wellness. Furthermore, many women and midwives voiced a need for trusted sources of guidance. Therefore, national policy on nutrition (Public Health England, 2018) and diet during pregnancy should incorporate suggestions that are tailored to the needs of women from different ethnic groups (NHS, 2023).

## **7.6 Conclusions**

This study offers a unique contribution to knowledge by novel application of mindlines theory to improve midwives' consultations with pregnant South Asian women regarding GWG. Mindline enhancement offers a promising approach to facilitating EBP by acknowledging the wealth of evidence that informs practice. In this study, the combined evidence led to the creation of mindline-informed strategies that have the potential to support midwives to have culturally sensitive consultations about weight with South Asian women. This approach provides a basis for further research into mindline enhancement to improve practice in healthcare.

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# **Appendix 1 – Semi-structured interview script for pregnant women**

## **Begin recording**

### **Rapport-building**

- Ask how they are keeping.
- So is this your first pregnancy? How is it going?
- How many weeks pregnant are you?
- Discuss my own work and project informally.

### **Overview of project**

This is a study about knowledge sharing about weight management during pregnancy. The information captured in the interview will be used to inform the development of new ways to share knowledge and understanding. Your information will be treated confidentially. Anything disclosing your identity won't be captured in transcripts.

What I'm hoping to get from talking to you and other pregnant ladies is a sense of "walking in your shoes", really understanding your experiences with weight management during pregnancy and how it has felt.

### **Questions**

1. What are your first thoughts around weight gain in pregnancy?
2. What information have you had about weight gain?
3. Where has this come from?
4. What has been useful?
5. What has not been useful?
6. What are your thoughts around the "eating for two" motto?
7. Who / what have you taken most notice of – and why?
8. Are you aware of any South Asian specific advice or beliefs about weight gain?
9. What do you consider to be a 'healthy' weight gain in pregnancy?
10. What weight related discussions have you had with your midwife?
11. How can women best be supported in achieving this – what are the things that make it more difficult?
12. Is there any knowledge around pregnancy-related weight gain that you feel midwives/pregnant women are lacking?
  - a. Why do you think this is?



Thank you for taking part in this study. Your contribution has been so helpful. Is there anything else that you would like to comment on that didn't spring to mind earlier?

Ask participant if they know any other South Asian pregnant women that they could share the study details with (either through word-of-mouth or social media groups).

Also tell them about Phase 2 and see if they are interested – ask for permission to keep their contact details for next phase

### **Stop recording**

Ask participant to complete anonymous demographic details form in their own time and return to me through e-mail.

## **Appendix 2 – Semi-structured interview script for midwives/final-year student midwives**

### **Begin recording**

### **Rapport-building**

- Ask how they are keeping.
- Discuss my own work and project informally.

### **Formal overview of project**

This is a study about knowledge sharing about weight management during pregnancy. The information captured in the interview will be used to inform the development of new ways to share knowledge and understanding. Your information will be treated confidentially. Anything disclosing your identity won't be captured in transcripts.

What I'm hoping to get from talking to you and other midwives is a sense of "walking in your shoes", really understanding your experiences with supporting pregnant women with their weight and how it has felt.

### **Questions**

1. What are your first thoughts around weight gain in pregnancy?
2. What information have you had about how to support pregnant women with their weight?
3. Where has this come from?
4. What has been useful?
5. What has not been useful?
6. Who / what have you taken most notice of when supporting women – and why?
7. Have you noticed any differences in how South Asian women respond to advice or how they manage their weight?
8. What do you consider to be a 'healthy' weight gain in pregnancy?
9. What is your specific role in supporting a healthy weight? How do you feel about this?
10. How do women tend to react?
11. How can midwives best be supported to helping women – what are the things that make it more difficult?
12. Is there any knowledge around pregnancy-related weight gain that you feel midwives/pregnant women are lacking?
  - a. Why do you think this is?

Thank you for taking part in this study. Your contribution has been so helpful. Is there anything else that you would like to comment on that didn't spring to mind earlier?

Ask participant if they know any other midwives that they could share the study details with (either through word-of-mouth or social media groups).

Also tell them about Phase 2 and see if they are interested – ask for permission to keep their contact details for next phase

### **Stop recording**

Ask participant to complete anonymous demographic details form in their own time and return to me through e-mail.

## Appendix 3 – Invitation letter for pregnant women



### Could you help with a study about weight management in pregnancy?

I am a research student at Birmingham City University. I am interested in how midwives may best support South Asian women to manage their weight during pregnancy.

I would like to invite you to take part in a face-to-face or virtual interview at a date and time that is convenient for you. If you choose to have a face-to-face interview, the interview will be conducted at your preferred location, which can be any private location.

The interview will last no longer than one hour and will be recorded. Interviews will involve a discussion in English. If you do not feel confident in spoken English, you are welcome to bring a friend or relative who can interpret along with you.

I will ask you some questions about your experiences of weight management in pregnancy. There are no right or wrong answers. I want to learn from your experiences as they contribute to my understanding of how knowledge is shared amongst pregnant women and midwives.

If you would like more information or are interested in participating you are very welcome to contact me on tel: 0779 264 6775 or via email: [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

Thank you for your interest in my study.

Best wishes,  
Sereena Raju  
Graduate Research and Teaching Assistant  
Birmingham City University

## Appendix 4 – Poster to advertise Stage 1 of the study to pregnant women



### Study for South Asian pregnant women in England (aged 18 and over)

- This is a study about how knowledge about weight is shared amongst South Asian pregnant women and midwives.
- Participants will be invited to take part in a face-to-face or virtual interview with the researcher for up to 1 hour and will receive a £10 Amazon voucher.
- The findings will support new ways to share knowledge between South Asian pregnant women and midwives.

For further information, please contact:

Sereena Raju

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

0779 264 6775

## **Appendix 5 – Link to Health Talk show on Kanshi TV**

<https://www.youtube.com/watch?v=zZdPKUDi3ME>

## **Appendix 6 – Participant information sheet for Stage 1 – pregnant women**



### **Weight management in pregnancy: understanding women's experiences**

I would like to invite you to take part in my research study. Joining the study is entirely up to you. Before you decide I would like you to understand why the research is being done and what it would involve for you.

The first part of the Participant Information Sheet tells you the purpose of the study and what will happen to you if you take part. The second part will give you more detailed information about how the study is carried out. This study is being sponsored by Birmingham City University.

### **Summary**

I am inviting you to take part because your experience as a pregnant woman will help me to understand how knowledge is shared amongst midwives and pregnant women. The aims of this study are:

1. To explore your experiences of managing your weight during pregnancy.
2. To explore the different sources of information about pregnancy-related weight management that you have come across.

### **What will I need to do if I take part?**

You will be asked to take part in an interview at a date and time that is convenient for you for no longer than one hour. This may be in person (if current COVID guidance allows) or online on Microsoft Teams. It does not matter if you do not have Microsoft Teams as it can be accessed online through a link that you will receive from me. The interview will be recorded and only I will have access to the recording.

### **How will I use information about you?**

I will need to use information from you for this research project. This information will include your responses to questions and your age group, ethnic background and whether this is your first or second (etc.) pregnancy. This will help me to produce a summary of the findings. I will keep all information about you safe and secure. I will write the findings in a way that no-one can work out that you took part in the study.

The transcript won't contain anything that allows you to identify a person. Recordings will be password-protected and captured on a University-encrypted device. Following GDPR

principles (2019), these will be destroyed securely after the transcripts are completed. Personal data from the demographics form will be stored on the University encrypted OneDrive until completion of the project and then destroyed.

### **What are your choices about how your information is used?**

You can stop being part of the study at any time, without giving a reason, but I will keep information about you that I already have.

### **Where can you find out more about how your information is used?**

You can find out more about how I will use your information by sending an email to [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

### **Possible benefits of taking part**

Your involvement will help to influence how knowledge is shared amongst midwives and South Asian pregnant women in Birmingham. Over time, this will contribute towards better health outcomes for other South Asian pregnant women. You will also receive a £10 Amazon voucher to thank you for your time.

### **Possible risks**

- There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to happen. You do not have to give me any reason for not responding to any question, or for refusing to take part in the interview. You are free to withdraw from the study at any stage. Any information provided before that point will be kept for the report.
- Your information will be treated confidentially. However, I may need to tell a safeguarding lead if I learn that you or another person is at risk of danger. The transcript won't contain anything that allows you to identify a person.

### **Supporting Information**

- The findings of the research will be captured in a final study report, which will be sent to you through e-mail if you would like to receive this. Please let me know if you would like a copy by contacting me through the details at the bottom of this sheet. The findings may also be shared in research articles and conference presentations. However, they will be written in a way to make sure that no-one can work out that you took part in the study.



- This study is being funded by Birmingham City University. It has been reviewed by the University faculty's academic ethics committee and NHS ethics committee.

### **Project supervisors**

The following supervisors are involved in an advisory role in this project:

Professor Fiona Cowdell

Dr Robert Cook

Dr Judith Dyson

If you have any questions or concerns about the study, please contact Fiona Cowdell, the primary supervisor of this project: [Fiona.Cowdell@bcu.ac.uk](mailto:Fiona.Cowdell@bcu.ac.uk)

### **Issuing a complaint**

If you have a complaint, please e-mail the Health, Education and Life Sciences Ethics team: [HELS\\_Ethics@bcu.ac.uk](mailto:HELS_Ethics@bcu.ac.uk)

### **How to contact me**

If you have any questions about this study, please send an e-mail to:

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

or telephone me on 0779 264 6775

### **What to do if you would like to participate**

Please sign (by typing your full name) and e-mail the attached e-consent form to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

If you have a physical copy of the consent form, please sign the form, take a photograph of it, and e-mail it to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

***The findings of this study will contribute towards a follow-up study involving co-design. If you are interested in this:*** Please e-mail me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk) or telephone me on 0779 264 6775 if you would like an information sheet.

## Appendix 7 – Invitation letter for midwives and final-year student midwives



### Could you help with a study about weight management in pregnancy?

I am a research student at Birmingham City University. I am interested in how midwives can be best supported to help South Asian women to manage their weight during pregnancy.

I would like to invite you to take part in a face-to-face or virtual interview at a date and time that is convenient for you. If you choose to have a face-to-face interview, the interview will be conducted at your preferred location, which can be any private location. The interview will last no longer than one hour and will be recorded.

I will ask you some questions about your experiences of supporting women (including those who are South Asian) with their weight during pregnancy. There are no right or wrong answers. I want to learn from your experiences as they contribute to my understanding of how knowledge is shared amongst pregnant women and midwives.

If you would like more information or are interested in participating you are very welcome to contact me on tel: 0779 264 6775 or via email: [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

Thank you for your interest in my study.

Best wishes,

Sereena Raju

Graduate Research and Teaching Assistant

Birmingham City University

## Appendix 8 – Poster to advertise Stage 1 of the study to midwives and final-year student midwives



### Study for midwives and final-year student midwives in England

- This is a study about how knowledge about weight is shared amongst midwives and pregnant women.
- Participants will be invited to take part in a face-to-face or virtual interview with the researcher for up to 1 hour and will receive a £10 Amazon voucher.
- The findings will support new ways to share knowledge between South Asian pregnant women and midwives.

For further information, please contact:

Sereena Raju

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

0779 264 6775

## **Appendix 9 – Participant information sheet for Stage 1 – midwives and final-year student midwives**



### **Weight management in pregnancy: understanding midwives' experiences**

I would like to invite you to take part in my research study. Joining the study is entirely up to you. Before you decide I would like you to understand why the research is being done and what it would involve for you.

The first part of the Participant Information Sheet tells you the purpose of the study and what will happen to you if you take part. The second part will give you more detailed information about how the study is carried out. This study is being sponsored by Birmingham City University.

### **Summary**

I am inviting you to take part because your experience as a midwife will help me to understand how knowledge is shared amongst midwives and pregnant women. The aims of this study are:

1. To explore your experiences of providing support with weight management during pregnancy.
2. To explore your experiences of having discussions about weight.

### **What will I need to do if I take part?**

You will be asked to take part in an interview at a date and time that is convenient for you for no longer than one hour. This may be in person (if current COVID guidance allows) or online on Microsoft Teams. It does not matter if you do not have Microsoft Teams as it can be accessed online through a link that you will receive from me. The interview will be recorded and only I will have access to the recording.

### **How will I use information about you?**

I will need to use information from you for this research project. This information will include your responses to questions and your age group, ethnic background and department. This will help me to produce a summary of the findings. I will keep all information about you safe and secure. I will write the findings in a way that no-one can work out that you took part in the study.

The transcript won't contain anything that allows you to identify a person. Recordings will be password-protected and captured on a University-encrypted device. Following GDPR principles (2019), these will be destroyed securely after the transcripts are completed. Personal data from the demographics form will be stored on the University encrypted OneDrive until completion of the project and then destroyed.

### **What are your choices about how your information is used?**

You can stop being part of the study at any time, without giving a reason, but I will keep information about you that I already have.

### **Where can you find out more about how your information is used?**

You can find out more about how I will use your information by sending an email to

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

### **Possible benefits of taking part**

Your involvement will help to influence how knowledge is shared amongst midwives and South Asian pregnant women in Birmingham. Over time, this will contribute towards better health outcomes for other South Asian pregnant women. Your involvement will also help you to produce written reflective accounts as part of re-validation requirements. You will also receive a £10 Amazon voucher to thank you for your time.

### **Possible risks**

- There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to happen. You do not have to give me any reason for not responding to any question, or for refusing to take part in the interview. You are free to withdraw from the study at any stage. Any information provided before that point will be kept for the report.
- Your information will be treated confidentially. However, I may need to tell a relevant person (e.g. safeguarding lead or line manager depending upon the situation) if I learn about harmful practice. The transcript won't contain anything that allows you to identify a person.

### **Supporting Information**

- The findings of the research will be captured in a final study report, which will be sent to you through e-mail if you would like to receive this. Please let me know if you

would like a copy by contacting me through the details at the bottom of this sheet. The findings may also be shared in research articles and conference presentations. However, they will be written in a way to make sure that no-one can work out that you took part in the study.

- This study is being funded by Birmingham City University. It has been reviewed by the University faculty's academic ethics committee and NHS ethics committee.

### **Project supervisors**

The following supervisors are involved in an advisory role in this project:

Professor Fiona Cowdell

Dr Robert Cook

Dr Judith Dyson

If you have any questions or concerns about the study, please contact Fiona Cowdell, the primary supervisor of this project: [Fiona.Cowdell@bcu.ac.uk](mailto:Fiona.Cowdell@bcu.ac.uk)

### **Issuing a complaint**

If you have a complaint, please e-mail the Health, Education and Life Sciences Ethics team: [HELS\\_Ethics@bcu.ac.uk](mailto:HELS_Ethics@bcu.ac.uk)

### **How to contact me**

If you have any questions about this study, please send an e-mail to:

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

or telephone me on 0779 264 6775

### **What to do if you would like to participate**

Please sign (by typing your full name) and e-mail the attached e-consent form to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

If you have a physical copy of the consent form, please sign the form, take a photograph of it, and e-mail it to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

***The findings of this study will contribute towards a follow-up study involving co-design. If you are interested in this:*** Please e-mail me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk) or telephone me on 0779 264 6775 if you would like an information sheet.

## Appendix 10 – Consent sheet for Stage 1



### CONSENT FORM

Title of Project: Weight management in pregnancy: understanding pregnant women and midwives' experiences

Name of Researcher: Sereena Raju

Please initial box

1. I confirm that I have read the information sheet dated 25<sup>th</sup> April 2022 (version 1.8) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
3. I consent to the interview being recorded.
4. I understand that my information will be managed and destroyed securely.
5. I agree to take part in the above study.

☐☐☐☐☐

\_\_\_\_\_  
Name of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name of Person  
taking consent

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

When completed: 1 for participant; 1 for researcher site file

## Appendix 11 – Demographic details form

Thank you very much for your participation in this study. Please answer a few questions about yourself below.

**1. Did you take part in this study because of your experience as a...**

Choose an item.

**2. Please select which region you work at if you are a midwife or live in if you are a pregnant woman or new mother.**

Choose an item.

**3. If you are a pregnant woman or new mother, please select your age category below.**

Choose an item.

**4. If you are a midwife, how long you have been practising for?**

Choose an item.

**5. If you are a student midwife or midwife, which of the following settings do you work in at the moment?**

- ☐ Community
- ☐ Midwife-led alongside unit
- ☐ Midwife-led freestanding unit
- ☐ Obstetric unit/delivery suite
- ☐ Antenatal clinic
- ☐ Antenatal ward
- ☐ Postnatal ward
- ☐ Home birth
- ☐ Scanning

- ☐ Rotational/integrated midwife
- ☐ Specialist midwife
- ☐ Other (please specify)

- ☐ Prefer not to say

**6. How would you describe your ethnic group? Please select one option below.**

- ☐ White - British
- ☐ White - Irish
- ☐ White - Gypsy or Irish Traveller
- ☐ Any other White background
- ☐ Mixed - White and Black Caribbean

- ☐ Mixed - White and Black African
- ☐ Mixed - White and Asian
- ☐ Any other Mixed/Multiple ethnic background

- ☐ Asian/Asian British - Indian
- ☐ Asian/Asian British - Pakistani
- ☐ Asian/Asian British - Bangladeshi
- ☐ Asian/Asian British - Chinese
- ☐ Any other Asian background, please describe

- ☐ Black - African
- ☐ Black - Caribbean
- ☐ Any other Black/African/Caribbean background
- ☐ Prefer not to say



Any other background (please specify)

Thank you very much for completing this form.

## Appendix 12 – Scripts and links to digital stories

Passages highlighted in yellow – from literature reviews.

Passages highlighted in green – from Stage 1 interviews.

### Script – midwife

Just got back from my shift. You wouldn't believe what happened. One of my clients "got very angry and just stood up and walked off and left her partner" in the room because I started talking about the impact of her weight. (Sighs). But *honestly*, I really didn't want to cause offence. D'you know what I mean? Cause "if you look at me it's the pot calling the kettle black isn't it." It's hard enough when you're not pregnant!

But I know that a "lot of ladies might have underlying problems or relationship troubles and something that is getting them down that's making them feel they don't want to exercise, or they don't want to go out." But some of them "don't see having a BMI of 40 or over as being a problem". I can hardly blame them, cause these days, it's "become 'normal' to be overweight". You know, it's "bigger this and supersize that, so it's, I think it is hard now for women". Plus I think it must be difficult for our South Asian women too, because a lot of them "cook for...a huge amount of people most of the time.... I guess it's like if you're trying to quit smoking and all of your household smokes. It just takes a lot of willpower. And most of them have a lot of difficulties with that."

It's just so hard for us to stay on top of all of the information out there, I wouldn't really know *where* to signpost our women. "(W)e tell women they have a raised or very low BMI that will be detrimental to yours and baby's health but then we haven't actually got anything we can tell them or anything we can do for them". And "I don't think we know what is acceptable weight gain." It would help if we had more training in what and how to advise, and to know what happens to our ladies after we refer them to the dietician. But then it's swings and roundabouts, cause there's barely enough time to fit everything else in!

The staff room has been a bit of a mixed bag to say the least. A few of my colleagues don't seem to think it's their responsibility to support these women. But some of the others are doing a fab job. I had to chuckle when they suggested having those "informative chats while you're doing other things on the couch or while you're checking their blood pressure" (laughs). They told me that they let their clients take the lead in their chats, so that the advice suits the woman in front of them. They found that it helped to talk about all the good it can do for the baby and the family. And they even invited the partners along to the sessions! Some of them have shared their feedback on communication training in the past – glowing with confidence they were! But that's all well and good. How do we know that this is going to work in the long-term?

Link to digital story: <https://screencast-o-matic.com/watch/c3jvICVTcII>

## Script – pregnant woman

It's been sooo hard to exercise over the last few months. I just haven't had the energy to do what I used to be able to do. Plus all the aunties keep telling me to rest and take it easy, which isn't helping me to stay motivated. I think they're scared that it might hurt the baby. (Sighs). My diet's taken a bit of nosedive too. "I try to cut rice out, but it's impossible in our culture." Plus I'm getting these crazy cravings. Sometimes I feel like "all I wanna eat all day is cake and pancakes ...and whipped cream." And it doesn't help with Mum telling me "to have milk with *butter* in it...It just feels like ... a *huge* influx of calories." I think she'd be proud if I had "big fat babies, (laughs) which is wrong." Funny how it's affected my best friend differently. She "can't even take fried foods" – she said it gives her "heartburn for hours". She's trying to help me, bless her. The other day "(s)he was, like, 'No more sodas, no more sodas.'" (Laughs). I think she must have learned loads from that weight support programme she was on, and the friends she made. She that it changed how she thought about what she was eating. But it's tricky find the time to make the meals she suggests, especially when "I'm coming home at 9:00 at night and I gotta feed my family".

My midwife hasn't mentioned my weight yet. She'll "talk about all these horrible illnesses that children can have and you can have,....So why can you not have a conversation about the weight?" I wanted to know what specific foods I should be eating. Some of my friends said their midwives gave them tips on the best foods to eat, things that would really nourish the baby. If I knew what could help my baby I would have more of those things. But "(a)ll the midwives always seem to be really busy and I think with the pandemic whenever I see them, there's just so much more going on now..."

I haven't the foggiest whether I'm gaining too much or too little weight, or where I'm supposed to go to find the right information. It's a real minefield out there. My WeightWatchers app gave me "extra to eat, which I didn't expect till, like the last trimester....I don't know if they're going off dodgy information". So what should I do?

Link to digital story: <https://screencast-o-matic.com/watch/c3QIQNVOIBB>

## **Appendix 13 – Quiz and slides used in first co-design workshop**

### **Quiz questions**

Participants were asked to answer “true” or “false” anonymously to the following:

1. Food cravings during pregnancy are out of our control. (Correct answer – false).
2. The mother’s diet can influence the child’s DNA and future health. (Correct answer – true).
3. Foods labelled as “low-fat” are always a healthy option. (Correct answer – false).
4. Women should rest as much as possible during pregnancy. (Correct answer – false).
5. Stress can lead to an increased appetite and an increased risk of weight gain. (Correct answer – true).
6. Good sleep quality can support effective weight management during pregnancy. (Correct answer – true).

### **PowerPoint slides alongside quiz**



Copy of slides

## **Appendix 14 – Participant information sheet for Stage 2 – pregnant women and new mothers**



### **A co-design study with midwives, South Asian pregnant women and new mothers**

I would like to invite you to take part in my research study. Joining the study is entirely up to you. Before you decide I would like you to understand why the research is being done and what it would involve for you.

The first part of the Participant Information Sheet tells you the purpose of the study and what will happen to you if you take part. The second part will give you more detailed information about how the study is carried out. This study is being sponsored by Birmingham City University.

### **Summary**

I am inviting you to take part because your experience during pregnancy will help to develop new ways of sharing knowledge between midwives and South Asian pregnant women. The aims of this study are:

1. To discuss your experiences of consultations about weight during pregnancy, and whether this matches research findings.
2. To think about new ways to share knowledge about weight during pregnancy between midwives South Asian pregnant women.
3. To collect your feedback on how I develop your ideas.

### **What will I need to do if I take part?**

You will be invited to take part in four workshops. These will be held on dates and times across September – November 2022. It would be good if you could attend all of these if you are able to. The sessions will be supported by myself and three facilitators and recorded within Microsoft Teams. Only I will have access to the recording. I am happy to provide support in using Microsoft Teams before the sessions.

The workshops will involve discussions in English. If you do not feel confident in spoken English, you are welcome to bring a friend or relative who can interpret along with you to each workshop (who is female if possible).

### **How will I use information about you?**

I will need to use information from you for this research project. This information will include your feedback in the workshops and your age group, ethnic background and whether this is

your first, second (etc.) pregnancy. This will help me to produce a summary of the findings. I will keep all information about you safe and secure. I will write the findings in a way that no-one can work out that you took part in the study.

The transcript won't contain anything that allows you to identify a person. Recordings will be password-protected and captured on a University-encrypted device. Following GDPR principles (2019), these will be destroyed securely after the transcripts are completed. Personal data from the demographics form will be stored on the University encrypted OneDrive until completion of the project and then destroyed.

### **What are your choices about how your information is used?**

You can stop being part of the study at any time, without giving a reason, but I will keep information about you that I already have.

### **Where can you find out more about how your information is used?**

You can find out more about how I will use your information by sending an email to [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

### **Possible benefits of taking part**

Your involvement will help to influence how knowledge is shared amongst midwives and South Asian pregnant women in Birmingham. Over time, this will contribute towards better health outcomes for other South Asian pregnant women. It will also provide you with a chance to meet other women from a similar background. You will also receive £25 at the end of the study if you attend all four workshops.

### **Possible risks**

- There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to happen. You do not have to give me any reason for not responding to any question, or for refusing to take part in the workshops. You are free to withdraw from the study at any stage. Any information provided before that point will be kept for the report.
- I will help to ensure confidentiality by asking the group to keep conversations to themselves. However, I may need to tell a safeguarding lead if I learn that you or another person is at risk of danger. The transcript won't contain anything that allows you to identify a person.

### **Supporting Information**

- The findings of the research will be captured in a final study report, which will be sent to you through e-mail if you would like to receive this. Please let me know if you would like a copy by contacting me through the details at the bottom of this sheet. The findings may also be shared in research articles and conference presentations. However, they will be written in a way to make sure that no-one can work out that you took part in the study.
- This study is being funded by Birmingham City University. It has been reviewed by the University faculty's academic ethics committee and NHS ethics committee.

### **Project supervisors**

The following supervisors are involved in an advisory role in this project:

Professor Fiona Cowdell

Dr Robert Cook

Dr Judith Dyson

If you have any questions or concerns about the study, please contact Fiona Cowdell, the primary supervisor of this project: [Fiona.Cowdell@bcu.ac.uk](mailto:Fiona.Cowdell@bcu.ac.uk)

### **Issuing a complaint**

If you have a complaint, please e-mail the Health, Education and Life Sciences Ethics team: [HELS\\_Ethics@bcu.ac.uk](mailto:HELS_Ethics@bcu.ac.uk)

### **How to contact me**

If you have any questions about this study, please send an e-mail to: [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk) or telephone me on 0779 264 6775

### **What to do if you would like to participate**

Please sign (by typing your full name) and e-mail the attached e-consent form to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

If you have a physical copy of the consent form, please sign the form, take a photograph of it, and e-mail it to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

### **If you would like to receive more information about any aspect of pregnancy**

Please contact your midwife.

## Appendix 15 – Poster to advertise Stage 2 of the study to pregnant women and new mothers



### Co-design study for South Asian pregnant women and new mothers (up to 1-year postnatal)

- A study to develop new ways of sharing knowledge about weight during pregnancy between midwives and South Asian pregnant women.
- Participants must be aged 18 and over.
- Participants will be invited to take part in four virtual workshops and will receive £25 as a thank you for their attendance.

For further information about this study,  
please contact:

Sereena Raju

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

0779 264 6775



## Appendix 16 – Participant information sheet for Stage 2 – midwives



### **A co-design study with midwives, South Asian pregnant women and new mothers**

I would like to invite you to take part in my research study. Joining the study is entirely up to you. Before you decide I would like you to understand why the research is being done and what it would involve for you.

The first part of the Participant Information Sheet tells you the purpose of the study and what will happen to you if you take part. The second part will give you more detailed information about how the study is carried out. This study is being sponsored by Birmingham City University.

### **Summary**

I am inviting you to take part because your experience as a midwife will help to develop new ways of sharing knowledge between midwives and South Asian pregnant women. The aims of this study are:

1. To discuss your experiences of consultations about weight during pregnancy, and whether this matches research findings.
2. To think about new ways to share knowledge about weight during pregnancy between midwives South Asian pregnant women.
3. To collect your feedback on how I develop your ideas.

### **What will I need to do if I take part?**

You will be invited to take part in four workshops. These will be held on dates and times across September – November 2022. It would be good if you could attend all of these if you are able to. The sessions will be supported by myself and three facilitators and recorded within Microsoft Teams. Only I will have access to the recording. I am happy to provide support in using Microsoft Teams before the sessions.

### **How will I use information about you?**

I will need to use information from you for this research project. This information will include your feedback in the workshops and your age group, ethnic background and department. This will help me to produce a summary of the findings. I will keep all information about you safe and secure. I will write the findings in a way that no-one can work out that you took part in the study.

The transcript won't contain anything that allows you to identify a person. Recordings will be password-protected and captured on a University-encrypted device. Following GDPR principles (2019), these will be destroyed securely after the transcripts are completed. Personal data from the demographics form will be stored on the University encrypted OneDrive until completion of the project and then destroyed.

### **What are your choices about how your information is used?**

You can stop being part of the study at any time, without giving a reason, but I will keep information about you that I already have.

### **Where can you find out more about how your information is used?**

You can find out more about how I will use your information by sending an email to [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

### **Possible benefits of taking part**

Your involvement will help to influence how knowledge is shared amongst midwives and South Asian pregnant women in Birmingham. Over time, this will contribute towards better health outcomes for other South Asian pregnant women. Your involvement will also help you to produce written reflective accounts as part of re-validation requirements. You will also receive £25 at the end of the study if you attend all four workshops.

### **Possible risks**

- There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to happen. You do not have to give me any reason for not responding to any question, or for refusing to take part in the workshops. You are free to withdraw from the study at any stage. Any information provided before that point will be kept for the report.
- I will help to ensure confidentiality by asking the group to keep conversations to themselves. However, I may need to tell a relevant person (e.g. safeguarding lead or line manager depending upon the situation) if I learn about harmful practice. The transcript won't contain anything that allows you to identify a person.

### **Supporting Information**

- The findings of the research will be captured in a final study report, which will be sent to you through e-mail if you would like to receive this. Please let me know if you

would like a copy by contacting me through the details at the bottom of this sheet. The findings may also be shared in research articles and conference presentations. However, they will be written in a way to make sure that no-one can work out that you took part in the study.

- This study is being funded by Birmingham City University. It has been reviewed by the University faculty's academic ethics committee and NHS ethics committee.

### **Project supervisors**

The following supervisors are involved in an advisory role in this project:

Professor Fiona Cowdell

Dr Robert Cook

Dr Judith Dyson

If you have any questions or concerns about the study, please contact Fiona Cowdell, the primary supervisor of this project: [Fiona.Cowdell@bcu.ac.uk](mailto:Fiona.Cowdell@bcu.ac.uk)

### **Issuing a complaint**

If you have a complaint, please e-mail the Health, Education and Life Sciences Ethics team: [HELS\\_Ethics@bcu.ac.uk](mailto:HELS_Ethics@bcu.ac.uk)

### **How to contact me**

If you have any questions about this study, please send an e-mail to: [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk) or telephone me on 0779 264 6775

### **What to do if you would like to participate**

Please sign (by typing your full name) and e-mail the attached e-consent form to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

If you have a physical copy of the consent form, please sign the form, take a photograph of it, and e-mail it to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

## Appendix 17 – Poster to advertise Stage 2 of the study to midwives and final-year student midwives



### Co-design study for midwives and final-year student midwives in Birmingham

- A study to develop new ways of sharing knowledge about weight during pregnancy between midwives and South Asian pregnant women.
- Participants will be invited to take part in four virtual workshops and will receive £25 as a thank you for their attendance.

For further information about this study,  
please contact:

Sereena Raju

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

0779 264 6775

## Appendix 18 – Link to Tiktok video

[https://www.tiktok.com/@sereena830/video/7122807615708499205?is\\_from\\_webapp=v1&item\\_id=7122807615708499205&lang=en](https://www.tiktok.com/@sereena830/video/7122807615708499205?is_from_webapp=v1&item_id=7122807615708499205&lang=en)

## Appendix 19 – Consent form for Stage 2 – pregnant women, new mothers and midwives



### CONSENT FORM

Title of Project: A co-design study with midwives, South Asian pregnant women and new mothers

Name of Researcher: Sereena Raju

Please initial box

1. I confirm that I have read the information sheet dated 25<sup>th</sup> April 2022 (version 1.8) for the above study. I have had the opportunity to consider the information, ask questions

☐

and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.

☐

3. I consent to the workshops being recorded.

☐

4. I understand that my information will be managed and destroyed securely.

☐

5. I agree to take part in the above study.

☐

_____	_____	_____
Name of Participant	Date	Signature

_____	_____	_____
Name of Person taking consent	Date	Signature

When completed: 1 for participant; 1 for researcher site file

## Appendix 20 – Instructions for pre-session activity

Hello all,

A very warm welcome to this co-design study! Thank you for agreeing to take part in these workshops. I'm really looking forward to meeting you and can't wait for our first workshop.

😊 Please remember that the sessions will be very relaxed – I want to make sure that you feel as comfortable as possible. Please let me know if there is anything I can do to help you feel more comfortable during the sessions.

Our first workshop will be on Friday 16<sup>th</sup> September at 10:00am. Before this, it would be great if you could find a picture (or pictures) that makes you think of weight during pregnancy. This could be from anywhere – a magazine, the internet, or a photograph that you already have! At our first workshop, you will be invited to share your picture with the group, and why you chose this particular picture. I will also be sharing a picture that I have found. I hope this sounds okay and let me know if you have any questions.

Many thanks,

Sereena

## Appendix 21 – Co-design feedback survey

Thank you very much for taking part in this study. Please answer the questions below as openly as possible. The survey should take less than 10 minutes to complete and your responses will be strictly confidential.

### 1. Were you invited because of your experience as a...

Choose an item.

### 2. If you took part because of your experience as a pregnant woman, is this your first pregnancy?

Choose an item.

### 3. If this is not your first pregnancy, please specify below which pregnancy this is.

### 4. If you took part because of your experience as a new mother, how old is your baby?

Choose an item.

### 5. If you are a midwife, how long have you been practising for?

Choose an item.

### 6. If you are a student midwife or midwife, which of the following settings do you work in at the moment?

- |  |  |
|--|--|
| <input type="checkbox"/> Community                     | <input type="checkbox"/> Postnatal ward                |
| <input type="checkbox"/> Midwife-led alongside unit    | <input type="checkbox"/> Home birth                    |
| <input type="checkbox"/> Midwife-led freestanding unit | <input type="checkbox"/> Scanning                      |
| <input type="checkbox"/> Obstetric unit/delivery suite | <input type="checkbox"/> Rotational/integrated midwife |
| <input type="checkbox"/> Antenatal clinic              | <input type="checkbox"/> Specialist midwife            |
| <input type="checkbox"/> Antenatal ward                |  |
| <input type="checkbox"/> Other (please specify)        |  |

☐ Prefer not to say



**7. How old are you? Please select an option below.**

Choose an item.

**8. How would you describe your ethnic group? Please select one option below.**

- |  |   |
|--|---|
| <input type="checkbox"/> White - British                             | <input type="checkbox"/> Mixed - White and Black African              |
| <input type="checkbox"/> White - Irish                               | <input type="checkbox"/> Mixed - White and Asian                      |
| <input type="checkbox"/> White - Gypsy or Irish Traveller            | <input type="checkbox"/> Any other Mixed/Multiple ethnic background   |
| <input type="checkbox"/> Any other White background                  |   |
| <input type="checkbox"/> Mixed - White and Black Caribbean           |   |
|  |   |
| <input type="checkbox"/> Asian/Asian British - Indian                | <input type="checkbox"/> Black - African                              |
| <input type="checkbox"/> Asian/Asian British - Pakistani             | <input type="checkbox"/> Black - Caribbean                            |
| <input type="checkbox"/> Asian/Asian British - Bangladeshi           | <input type="checkbox"/> Any other Black/African/Caribbean background |
| <input type="checkbox"/> Asian/Asian British - Chinese               |   |
| <input type="checkbox"/> Any other Asian background, please describe | <input type="checkbox"/> Prefer not to say                            |
| Any other background (please specify)                                |   |

If you are a pregnant woman or new mother, please answer questions 9-12 below. They will help me learn about whether you are a first, second or third generation (etc.) migrant. Previous research suggests that there may be differences in the experiences of these groups. You do not have to answer these but it would be helpful if you do.

**9. Were you born in the United Kingdom?**

Choose an item.

**10. If you answered no to the question above, please specify below which country you were born in.**

**11. Please specify below which country each of your parents were born in.**

**12. Please specify below which country each of your grandparents were born in.**

**13. Please highlight the number that reflects how you feel about each statement below.**

	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly agree</b>
a. I am satisfied with the way the workshop sessions were organised	1	2	3	4	5
b. I found it easy to speak up during the workshops	1	2	3	4	5

**14. Were the workshops what you expected? Please circle one number below.**

<b>Not as expected</b>				<b>Fully as expected</b>
1	2	3	4	5

**15. a) If the workshops were not what you expected, how were they different?**

**16. During the workshops, how easy was it to do the tasks and activities we asked you to do? Please circle one number below.**

<b>Very difficult</b>				<b>Very easy</b>
1	2	3	4	5

**17. a) If the tasks or activities were not easy, what aspect of the workshops were the most difficult or challenging for you to do?**

**18. Did you feel valued and listened to during the workshop sessions? Please circle one number below.**

**Not  
valued  
or  
listened  
to**

**Very  
valued  
and  
listened  
to**

1

2

3

4

5

**19. a) If you did not feel valued or listened to, what could we have done to make you feel more valued or listened to?**

**Please use the space below to share any other thoughts about your experience in the workshops.**

Thank you very much for your feedback.

## Appendix 22 – Interview/focus group schedule

### **Begin recording**

#### *Rapport-building*

- I introduce myself before participants introduce themselves.
- Ask participants to keep any information shared in the discussion confidential.

#### *Overview of project*

This is a study about new ways to support knowledge sharing about weight during pregnancy. I've been working alongside a group of midwives and South Asian pregnant women/new mothers in Birmingham to co-design these. These are the prototypes that I have been working on. (To provide further detail about each prototype).

The information captured in the interview/focus group will be used to develop these prototypes further. Your information will be treated confidentially. Anything disclosing your identity won't be captured in transcripts.

What I'm hoping to get from talking to you is a sense of "walking in your shoes", really understanding your thoughts and feelings about these prototypes.

### **Intervention coherence**

1. How do you imagine the prototypes being used?

#### **Fidelity**

2. Would you give these to women/colleagues?
3. How well do you feel you could use these in the same way each time (e.g. postcard provided in the same way)?

#### **Burden**

4. What could get in the way of midwives using these prototypes? (Prompts: the work environment, time, motivation).
5. Could you give me a bit of detail about that? *(If more detail is needed)*.

### **Opportunity costs**

6. Would anything concern you about midwives using these? (e.g. In the time that you are watching this video, what would you otherwise be doing?)

**Unintended consequences**

7. The aim of this prototype strategy is to help midwives to support South Asian pregnant women with their weight. Could the strategies have any additional benefits? (Prompts: helping other groups of pregnant women, increased awareness in the general population, job satisfaction of midwives, improved relationships between midwives and women).
8. What negative effects of any of these strategies might there be? (Prompts: for example, the video might be time-consuming to watch.)

**Contextual adroitness**

9. Talk me through how these could be used in different maternity settings. (Example – how would a midwife in the community use this postcard in comparison with a midwife on an antenatal ward?)

**Affective attitude**

10. What are the pros and cons of each prototype?
11. What do you like the most and least about each of these?

**Perceived effectiveness**

12. To what extent could they help midwives to ask, advise and signpost or refer about weight with South Asian pregnant women?
13. If midwives use these, what impact do you think they could have on South Asian pregnant women? (Prompts: dietary changes, physical activity, engaging with relevant services).

**Dose**

14. How long do you think these would work for midwives?
15. How often do you think these would need to be updated/engaged with for midwives?

**Tailoring and modifications**

16. What would make these work better for midwives and South Asian pregnant women?
17. What would you add to these prototypes? What would you remove?
18. If you were deciding for your institution, which would you choose and why?

Thank you for taking part in this study. Your contribution has been so helpful. Is there anything else that you would like to comment on that didn't spring to mind earlier?

**Stop recording**

Ask participant(s) to complete anonymous demographic details form in their own time and return to me through e-mail

## Appendix 23 – Participant information sheet for Stage 3



### **New ways to share knowledge about weight during pregnancy: your feedback**

I would like to invite you to take part in my research study. Joining the study is entirely up to you. Before you decide I would like you to understand why the research is being done and what it would involve for you.

The first part of the Participant Information Sheet tells you the purpose of the study and what will happen to you if you take part. The second part will give you more detailed information about how the study is carried out.

### **Summary**

I am inviting you to take part because your experience as a midwife will help me to understand how knowledge can best be shared among midwives and pregnant women. The aim of this study is to gather your feedback on new ways to share knowledge about weight during pregnancy between midwives and South Asian pregnant women.

### **What will I need to do if I take part?**

You will be invited to share your views in an interview or focus group discussion, which will be recorded. You will have the option to choose whether you would like to take part in an interview or focus group discussion. This may be in person (if current COVID guidance allows) or online on Microsoft Teams. The interview/focus group will be recorded and only I will have access to the recording.

### **Possible benefits of taking part**

Your involvement will help to influence how knowledge is shared amongst midwives and South Asian pregnant women in Birmingham. Over time, this will contribute towards better health outcomes for other South Asian pregnant women. Your involvement will also help you to produce written reflective accounts as part of re-validation requirements. You will also receive a £10 Amazon voucher to thank you for your time.

### **Possible risks**

- There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, I do not wish for this to happen. You do not have to give me any reason for

not responding to any question, or for refusing to take part. You are free to withdraw from the study at any stage. Any information provided before that point will be kept for the report.

- Your information will be treated confidentially. However, I may need to tell a relevant person (e.g. safeguarding lead or line manager depending upon the situation) if I learn about harmful practice. The transcript won't contain anything that allows you to identify a person. Recordings will be password-protected and captured on a University-encrypted device. Following GDPR principles (2019), these will be destroyed securely after the transcripts are completed. Personal data from the demographics form will be stored on the University encrypted OneDrive until completion of the project and then destroyed.

### **Supporting Information**

- The findings of the research will be captured in a final study report, which will be sent to you through e-mail if you would like to receive this. Please let me know if you would like a copy by contacting me through the details at the bottom of this sheet. The findings may also be shared in research articles and conference presentations. However, they will be written in a way to make sure that no-one can work out that you took part in the study.
- This study is being funded by Birmingham City University. It has been reviewed by the University faculty's academic ethics committee and NHS ethics committee.

### **Project supervisors**

The following supervisors are involved in an advisory role in this project:

Professor Fiona Cowdell

Dr Robert Cook

Dr Judith Dyson

If you have any questions or concerns about the study, please contact Fiona Cowdell, the primary supervisor of this project: [Fiona.Cowdell@bcu.ac.uk](mailto:Fiona.Cowdell@bcu.ac.uk)

### **Issuing a complaint**

If you have a complaint, please e-mail the Health, Education and Life Sciences Ethics team: [HELS\\_Ethics@bcu.ac.uk](mailto:HELS_Ethics@bcu.ac.uk)

**How to contact me**

If you have any questions about this study, please send an e-mail to:

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

or telephone me on 0779 264 6775

**What to do if you would like to participate**

Please sign (by typing your full name) and e-mail the attached e-consent form to me at

[Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

If you have a physical copy of the consent form, please sign the form, take a photograph of it, and e-mail it to me at [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)



## Appendix 24 – Consent form for Stage 3



### CONSENT FORM

Title of Project: New ways to share knowledge about weight during pregnancy: your feedback

Name of Researcher: Sereena Raju

Please initial box

1. I confirm that I have read the information sheet dated 25th April 2022 (version 1.8) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.

☐

3. I consent to the interview/focus group discussion being recorded.

☐

4. I understand that my information will be managed and destroyed stored securely.

☐

5. I agree to take part in the above study.

☐

---

Name of Participant

---

Date

---

Signature

---

Name of Person  
taking consent

---

Date

---

Signature

When completed: 1 for participant; 1 for researcher site file

## Appendix 25 – Faculty approval letter from University



Faculty of Health, Education & Life Sciences Research Office  
Seacole Building, 8 Westbourne Road  
Birmingham B15 3TN

[HELS\\_Ethics@bcu.ac.uk](mailto:HELS_Ethics@bcu.ac.uk)

21/Feb/2022

Miss Sereena Raju [Sereena.Raju@mail.bcu.ac.uk](mailto:Sereena.Raju@mail.bcu.ac.uk)

Dear Sereena ,

**Re:** Raju /#10040 /sub1 /R(C) /2022 /Jan /HELS FAEC - Co-designing strategies to enhance midwives' gestational weight gain mindlines in relation to South Asian women in Birmingham

Thank you for your application and documentation regarding the above study. I am pleased to confirm that Birmingham City University has agreed to take on the role of Sponsor for BCU's part in the research.

The Faculty Academic Ethics Committee has approved this activity for review by the external ethics committee(s) stated in the application.

Birmingham City University can confirm that our insurance indemnity cover includes the actions of researchers working in suitable premises and under appropriate supervision. Our policy cover will not apply to liability that is more specifically insured under any policy covering medical negligence, malpractice or indemnity, professional errors, omissions or negligence.

A copy of BCU's insurance details is available at: <https://icity.bcu.ac.uk/Legal-Services-and-Compliance/Insurance/Index>

If you wish to make any changes to your proposed study (by request or otherwise), then you must submit an Amendment application to us. Examples of changes include (but are not limited to) adding a new study site, a new method of participant recruitment, adding a new method of data collection and/or change of Project Lead.

Please also note that the Committee should be notified of any serious adverse effects arising as a result of this activity. **Keep a copy of this letter along with the corresponding application for your records as evidence of approval.** If you have any queries, please contact [HELS\\_Ethics@bcu.ac.uk](mailto:HELS_Ethics@bcu.ac.uk)  
I wish you every success with your study.

Yours Sincerely,

Mrs. Clair Zawada

On behalf of the Health, Education and Life Sciences Faculty Academic Ethics Committee

## Appendix 26 – Favourable opinion letter from Research Ethics Committee



### East of England - Cambridge Central Research Ethics Committee

Equinox House  
City Link  
Nottingham  
NG2 4LA

**Please note:** This is the favourable opinion of the REC only and does not allow you to start your study at NHS sites in England until you receive HRA Approval

25 April 2022

Miss Sereena Raju  
2 Fieldfare Court  
Derby  
DE23 3XX

Dear Miss Raju

<b>Study title:</b>	<b>Co-designing strategies to enhance midwives' gestational weight gain mindlines in relation to South Asian women in Birmingham</b>
<b>REC reference:</b>	<b>22/EE/0079</b>
<b>Protocol number:</b>	<b>N/A</b>
<b>IRAS project ID:</b>	<b>301580</b>

The Proportionate Review Sub-committee of the East of England - Cambridge Central Research Ethics Committee reviewed the above application on 25 March 2022.

### Ethical opinion

On behalf of the Research Ethics Committee (REC), the sub-committee 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.

### **Good practice principles and responsibilities**

The [UK Policy Framework for Health and Social Care Research](#) sets out principles of good practice in the management and conduct of health and social care research. It also outlines the responsibilities of individuals and organisations, including those related to the four elements of [research transparency](#):

1. [registering research studies](#)
2. [reporting results](#)
3. [informing participants](#)
4. [sharing study data and tissue](#)

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

Confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or NHS management permission (in Scotland) should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System.

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

Sponsors are not required to notify the Committee of management permissions from host organisations.

### **Registration of Clinical Trials**

All research should be registered in a publicly accessible database and we expect all researchers, research sponsors and others to meet this fundamental best practice standard.

It is a condition of the REC favourable opinion that **all clinical trials are registered** on a publicly accessible database within six weeks of recruiting the first research participant. For this purpose, 'clinical trials' are defined as:

- clinical trial of an investigational medicinal product
- clinical investigation or other study of a medical device
- combined trial of an investigational medicinal product and an investigational medical device
- other clinical trial to study a novel intervention or randomised clinical trial to compare interventions in clinical practice.

Failure to register a clinical trial is a breach of these approval conditions, unless a deferral has been agreed by the HRA (for more information on registration and requesting a deferral see: [Research registration and research project identifiers](#)).

If you have not already included registration details in your IRAS application form you should

notify the REC of the registration details as soon as possible.

### Publication of Your Research Summary

We will publish your research summary for the above study on the research summaries section of our website, together with your contact details, no earlier than three months from the date of this favourable opinion letter.

Should you wish to provide a substitute contact point, make a request to defer, or require further information, please visit:

<https://www.hra.nhs.uk/planning-and-improving-research/application-summaries/research-summaries/>

**N.B. If your study is related to COVID-19 we will aim to publish your research summary within 3 days rather than three months.**

During this public health emergency, it is vital that everyone can promptly identify all relevant research related to COVID-19 that is taking place globally. If you haven't already done so, please register your study on a public registry as soon as possible and provide the REC with the registration detail, which will be posted alongside other information relating to your project. We are also asking sponsors not to request deferral of publication of research summary for any projects relating to COVID-19. In addition, to facilitate finding and extracting studies related to COVID-19 from public databases, please enter the WHO official acronym for the coronavirus disease (COVID-19) in the full title of your study. Approved COVID-19 studies can be found at:

<https://www.hra.nhs.uk/covid-19-research/approved-covid-19-research/>

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

### **After ethical review: Reporting requirements**

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

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study, including early termination of the study
- Final report
- Reporting results

The latest guidance on these topics can be found at

<https://www.hra.nhs.uk/approvals-amendments/managing-your-approval/>.

### **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").

## Approved documents

The documents reviewed and approved were:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Copies of materials calling attention of potential participants to the research [Poster_stage 1_pregnant women]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 1_midwives]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 2_pregnant women and new mothers]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 2_midwives]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 3 ]	1.2	10 December 2021
Interview schedules or topic guides for participants [Stage 1_interview schedule_pregnant women]	1.2	10 December 2021
Interview schedules or topic guides for participants [Stage 1_interview schedule_midwives]	1.2	10 December 2021
Interview schedules or topic guides for participants [Stage 3_interview or focus group schedule]	1.2	10 December 2021
IRAS Application Form [IRAS_Form_10032022]		10 March 2022
Letter from sponsor [Ethical approval]	1	21 February 2022
Letters of invitation to participant [Stage 1_invitation letter_pregnant women]	1.0	10 December 2021
Letters of invitation to participant [Stage 1_invitation letter_midwives]	1.0	10 December 2021
Non-validated questionnaire [Demographic details form]	1.2	10 December 2021
Non-validated questionnaire [Stage 2_co-design feedback survey]	1.2	10 December 2021
Participant consent form [Consent form_Stage 1]	1.2	10 December 2021
Participant consent form [Consent form_Stage 2]	1.2	10 December 2021
Participant consent form [Consent form_Stage 3]	1.2	10 December 2021
Participant information sheet (PIS) [PIS_Stage 1_pregnant women]	1.7	10 December 2021
Participant information sheet (PIS) [PIS_Stage 1_midwives]	1.7	10 December 2021
Participant information sheet (PIS) [PIS_Stage 2_pregnant women and new mothers]	1.7	10 December 2021
Participant information sheet (PIS) [PIS_Stage 2_midwives]	1.7	10 December 2021
Participant information sheet (PIS) [PIS_Stage 3]	1.7	10 December 2021
Research protocol or project proposal [Study protocol]	1.3	15 December 2021
Summary CV for Chief Investigator (CI) [CV]	1.0	22 February 2022
Summary CV for supervisor (student research) [Fiona Cowdell_CV]	2	07 March 2022
Summary CV for supervisor (student research) [Judith Dyson_CV]	1	09 March 2022

## Membership of the Proportionate Review Sub-Committee

The members of the Sub-Committee who took part in the review are listed on the attached sheet.

## Statement of compliance

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

## User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:

<http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/>

## HRA Learning

We are pleased to welcome researchers and research staff to our HRA Learning Events and online learning opportunities– see details at:

<https://www.hra.nhs.uk/planning-and-improving-research/learning/>

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

<b>IRAS project ID:</b> <b>301580</b>	<b>Please quote this number on all correspondence</b>
--	---

Yours sincerely

Katie Atkin  
Approvals Administrator

*On behalf of:*

**Miss Stephanie Ellis**  
**Chair**

Email: [cambridgecentral.rec@hra.nhs.uk](mailto:cambridgecentral.rec@hra.nhs.uk)

Enclosures: List of names and professions of members who took part in the review

“After ethical review – guidance for researchers”

Copy to: Miss Sereena Raju, Sponsor's Representative

Lead Nation

**East of England - Cambridge Central Research Ethics Committee Attendance at PRS**

**Sub-Committee of the REC meeting on 25 March 2022**

**Committee Members:**

<i>Name</i>	<i>Profession</i>	<i>Present</i>	<i>Notes</i>
Mr Andrew Bush	Director	Yes	
Ms Anita Chhabra	Clinical Trials Pharmacist	Yes	
Miss Stephanie Ellis	Former Civil Servant	Yes	

**Also in attendance:**

<i>Name</i>	<i>Position (or reason for attending)</i>
Miss Katie Atkin	Approvals Administrator



## Appendix 27 – Letter of approval from the Health Research Authority (HRA)



N/A Miss Sereena Raju2  
Fieldfare Court Derby  
DE23 3XXN/A

Email: [approvals@hra.nhs.uk](mailto:approvals@hra.nhs.uk)

04 May 2022

Dear Miss Raju

**HRA and Health and Care  
Research Wales (HCRW)**  
**Approval Letter**

<b>Study title:</b>	<b>Co-designing strategies to enhance midwives' gestational weight gain mindlines in relation to South Asian women in Birmingham</b>
<b>IRAS project ID:</b>	<b>301580</b>
<b>Protocol number:</b>	<b>N/A</b>
<b>REC reference:</b>	<b>22/EE/0079</b>
<b>Sponsor</b>	<b>Birmingham City University</b>

I am pleased to confirm that [HRA and Health and Care Research Wales \(HCRW\) Approval](#) has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

Please now work with participating NHS organisations to confirm capacity and capability, in line with the instructions provided in the "Information to support study set up" section towards the end of this letter.

**How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?**

HRA and HCRW Approval does not apply to NHS/HSC organisations within Northern Ireland and Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report(including this letter) have been sent to the coordinating centre of each participating nation.

The relevant national coordinating function/s will contact you as appropriate.

Please see [IRAS Help](#) for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

### **How should I work with participating non-NHS organisations?**

HRA and HCRW Approval does not apply to non-NHS organisations. You should work with your non-NHS organisations to [obtain local agreement](#) in accordance with their procedures.

### **What are my notification responsibilities during the study?**

The standard conditions document "[After Ethical Review – guidance for sponsors and investigators](#)", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

- Registration of research
- Notifying amendments
- Notifying the end of the study

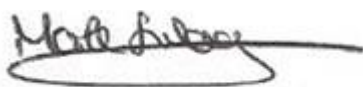
The [HRA website](#) also provides guidance on these topics, and is updated in the light of changes in reporting expectations or procedures.

### **Who should I contact for further information?**

Please do not hesitate to contact me for assistance with this application. My contact details are below.

Your IRAS project ID is **301580**. Please quote this on all correspondence.

Yours sincerely,



Mark Sidaway

Approvals Specialist

Email: [approvals@hra.nhs.uk](mailto:approvals@hra.nhs.uk)

Copy to: *Miss Sereena Raju*

## List of Documents

The final document set assessed and approved by HRA and HCRW Approval is listed below.

<i>Document</i>	<i>Version</i>	<i>Date</i>
Copies of materials calling attention of potential participants to the research [Poster_stage 1_pregnant women]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 1_midwives]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 2_pregnant women and new mothers]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 2_midwives]	1.2	10 December 2021
Copies of materials calling attention of potential participants to the research [Poster_stage 3 ]	1.2	10 December 2021
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Sponsor insurance certificate]	1	26 April 2022
Interview schedules or topic guides for participants [Stage 1_interview schedule_pregnant women]	1.2	10 December 2021
Interview schedules or topic guides for participants [Stage 1_interview schedule_midwives]	1.2	10 December 2021
Interview schedules or topic guides for participants [Stage 3_interview or focus group schedule]	1.2	10 December 2021
IRAS Application Form [IRAS_Form_10032022]		10 March 2022
Letter from sponsor [Ethical approval]	1	21 February 2022
Letters of invitation to participant [Stage 1_invitation letter_pregnant women]	1.0	10 December 2021
Letters of invitation to participant [Stage 1_invitation letter_midwives]	1.0	10 December 2021
Non-validated questionnaire [Demographic details form]	1.2	10 December 2021
Non-validated questionnaire [Stage 2_co-design feedback survey]	1.2	10 December 2021
Organisation Information Document [Organisation Information Document_v1.0]	1.0	21 March 2022
Participant consent form [Consent form_Stage 3]	1.2	10 December 2021
Participant consent form [Consent form_Stage 1]	1.2	10 December 2021
Participant consent form [Consent form_Stage 2]	1.2	10 December 2021
Participant information sheet (PIS) [PIS_Stage 1_midwives]	1.8	25 April 2022
Participant information sheet (PIS) [PIS_Stage 1_pregnant women]	1.8	25 April 2022
Participant information sheet (PIS) [PIS_Stage 2_midwives]	1.8	25 April 2022
Participant information sheet (PIS) [PIS_Stage 2_pregnant women and new mothers]	1.8	25 April 2022
Participant information sheet (PIS) [PIS_Stage 3]	1.8	26 April 2022
Research protocol or project proposal [Study protocol]	1.3	15 December 2021
Schedule of Events or SoECAT [Schedule of events_v1.1]	1.1	21 March 2022
Summary CV for Chief Investigator (CI) [CV]	1.0	22 February 2022
Summary CV for supervisor (student research) [Fiona Cowdell_CV]	2	07 March 2022
Summary CV for supervisor (student research) [Judith Dyson_CV]	1	09 March 2022

IRAS project ID	301580
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## Information to support study set up

The below provides all parties with information to support the arranging and confirming of capacity and capability with participating NHS organisations in England and Wales. This is intended to be an accurate reflection of the study at the time of issue of this letter.

Types of participating NHS organisation	Expectations related to confirmation of capacity and capability	Agreement to be used	Funding arrangements	Oversight expectations	HR Good Practice Resource Pack expectations
All sites will perform the same research activities therefore there is only one site type.	Research activities should not commence at participating NHS organisations in England or Wales prior to their formal confirmation of capacity and capability to deliver the study.	An Organisation Information Document has been submitted and the sponsor is not requesting and does not expect any other site agreement to be used.	No study funding will be provided to sites as per the Organisation Information Document	A Local Collaborator should be appointed at studysites.	No Honorary Research Contracts, Letters of Access or pre-engagement checks are expected for local staff employed by the participating NHS organisations. Where arrangements are not already in place, research staff not employed by the NHS host organisation undertaking any of the research activities listed in the research application would be expected to obtain a Letter of Access based on standard DBS checks and occupational health clearance.

## Other information to aid study set-up and delivery

*This details any other information that may be helpful to sponsors and participating NHS organisations in England and Wales in study set-up.*

The applicant has indicated that they do not intend to apply for inclusion on the NIHR CRN Portfolio.

## Appendix 28 – Word cloud responses to digital stories

Thoughts in relation to the video of pregnant women's experiences

Please share any thoughts in single-word summaries

Priorities Guilt Routine confusion  
Frustration **Time** tricky doubt  
Family pressure lack of information  
Culture Image

14 responses

ID	Start time	Completion time	Please share any thoughts in single-word summaries
1	9/16/22 10:25:53	9/16/22 10:26:03	Culture
2	9/16/22 10:25:51	9/16/22 10:26:17	confusion
3	9/16/22 10:26:04	9/16/22 10:26:18	Guilt
4	9/16/22 10:25:57	9/16/22 10:26:18	Priorities
5	9/16/22 10:25:53	9/16/22 10:26:29	Frustration
6	9/16/22 10:26:18	9/16/22 10:26:30	information
7	9/16/22 10:25:56	9/16/22 10:26:40	lack of information
8	9/16/22 10:26:19	9/16/22 10:26:43	Time
9	9/16/22 10:26:30	9/16/22 10:26:55	time
10	9/16/22 10:26:56	9/16/22 10:27:14	tricky
11	9/16/22 10:26:29	9/16/22 10:27:19	doubt
12	9/16/22 10:26:19	9/16/22 10:27:29	Routine
13	9/16/22 10:26:43	9/16/22 10:27:35	Image
14	9/16/22 10:33:02	9/16/22 10:33:19	Family pressure

## Thoughts about video of midwives' experiences

Please share any thoughts in single-word summaries



14 responses

ID	Start time	Completion time	Please share any thoughts in single-word summaries
1	9/16/22 10:36:31	9/16/22 10:36:39	busy
2	9/16/22 10:36:32	9/16/22 10:36:42	Lack of info.
3	9/16/22 10:36:32	9/16/22 10:36:52	Doubt
4	9/16/22 10:36:31	9/16/22 10:36:52	pressure
5	9/16/22 10:36:32	9/16/22 10:36:54	sensitive
6	9/16/22 10:36:40	9/16/22 10:36:59	sensitive subject
7	9/16/22 10:36:52	9/16/22 10:36:59	Time
8	9/16/22 10:36:34	9/16/22 10:37:01	Priorities
9	9/16/22 10:36:59	9/16/22 10:37:05	Confidence
10	9/16/22 10:36:53	9/16/22 10:37:12	Lack of standardisation
11	9/16/22 10:37:02	9/16/22 10:37:14	Medicalisation
12	9/16/22 10:36:52	9/16/22 10:37:23	Time
13	9/16/22 10:36:54	9/16/22 10:37:23	culture
14	9/16/22 10:37:12	9/16/22 10:37:35	Inability to relate

## Appendix 29 – Word cloud responses to quiz

### Thoughts about information on cravings

What do you think about this? Please use one-word summaries

individualised hormones surprising  
Negativity **Difficult** Baby Assumptions  
Beliefs Willpower Distraction can help

12 responses

ID	Start time	Completion time	What do you think about this? Please use one-word summaries
1	9/16/22 10:57:25	9/16/22 10:57:39	Willpower
2	9/16/22 10:57:23	9/16/22 10:57:43	surprising
3	9/16/22 10:57:24	9/16/22 10:57:45	Difficult
4	9/16/22 10:57:45	9/16/22 10:57:52	individualised
5	9/16/22 10:57:40	9/16/22 10:57:54	Distraction can help
6	9/16/22 10:57:43	9/16/22 10:57:54	difficult
7	9/16/22 10:57:54	9/16/22 10:58:12	Beliefs
8	9/16/22 10:57:39	9/16/22 10:58:17	Assumptions
9	9/16/22 10:57:26	9/16/22 10:58:34	alternative
10	9/16/22 10:57:55	9/16/22 10:58:38	hormones
11	9/16/22 10:58:17	9/16/22 10:58:42	Negativity
12	9/16/22 10:58:13	9/16/22 10:58:43	"Baby needs it"

### Thoughts about dietary information (including food substitutes and Eatwell plate)

What do you think about this? Please use one-word summaries

imagery productive interesting  
Labelling **helpful** impractical  
Advertising Timing  
Food industry School curriculum

12 responses



ID	Start time	Completion time	What do you think about this? Please use one-word summaries
1	9/16/22 11:08:41	9/16/22 11:08:49	productive
2	9/16/22 11:08:41	9/16/22 11:08:54	impractical
3	9/16/22 11:08:43	9/16/22 11:08:55	School curriculum
4	9/16/22 11:08:49	9/16/22 11:09:00	helpful
5	9/16/22 11:08:52	9/16/22 11:09:11	Food industry
6	9/16/22 11:08:56	9/16/22 11:09:17	Timing
7	9/16/22 11:08:42	9/16/22 11:09:21	helpful
8	9/16/22 11:08:54	9/16/22 11:09:23	interesting
9	9/16/22 11:09:18	9/16/22 11:09:34	Advertising
10	9/16/22 11:09:00	9/16/22 11:09:36	imagery
11	9/16/22 11:09:29	9/16/22 11:09:49	Information
12	9/16/22 11:09:35	9/16/22 11:09:51	Labelling

### Further thoughts to share at the end of quiz

Please share any further thoughts in one-word summaries


sharing sl Interesting  
informative useful Thought provoking  
sleep fascinating Long term

11 responses

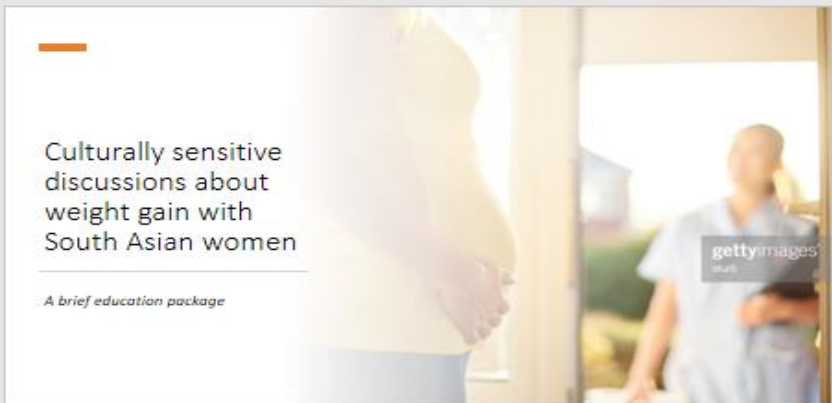
ID	Start time	Completion time	Please share any further thoughts in one-word summaries
1	9/16/22 11:28:25	9/16/22 11:28:29	useful
2	9/16/22 11:28:21	9/16/22 11:28:43	useful
3	9/16/22 11:28:21	9/16/22 11:28:49	fascinating
4	9/16/22 11:28:22	9/16/22 11:28:56	Thought provoking
5	9/16/22 11:28:49	9/16/22 11:29:01	sharing
6	9/16/22 11:28:20	9/16/22 11:29:09	informative
7	9/16/22 11:29:02	9/16/22 11:29:09	sl
8	9/16/22 11:28:59	9/16/22 11:29:16	Interesting
9	9/16/22 11:28:56	9/16/22 11:29:16	Important
10	9/16/22 11:29:10	9/16/22 11:29:23	sleep
11	9/16/22 11:29:17	9/16/22 11:29:25	Long term

## Appendix 30 – Prototypes presented to co-designers

### *Prototype of the 15-minute talk on the topic at annual mandatory training day for midwives*

<h4>15-minute launch of education package</h4> <ol style="list-style-type: none"><li>1. Quick Sli-do poll to gauge how midwives feel about giving advice.</li><li>2. Share video summarising pregnant women's experiences</li></ol> <div></div> <p><a href="#">click here</a></p> <ol style="list-style-type: none"><li>3. Introduce module content</li></ol>	<h4>Module content</h4> <ol style="list-style-type: none"><li>1. Practical guidance to support consultations:<ul style="list-style-type: none"><li>• <i>Why</i> this is important</li><li>• <i>What</i> to include in consultations</li><li>• <i>How</i> to provide support</li><li>• <i>When</i> to provide advice</li></ul></li><li>2. Research evidence in relation to healthy weight management during pregnancy.</li></ol>
1 ★	2 ★

## Prototype of the brief education package for newly qualified midwives



Culturally sensitive discussions about weight gain with South Asian women

A brief education package

1 ★

### Content overview

1. Practical guidance to support consultations
  - *Why this is important*
  - *What to include in consultations*
  - *How to provide support*
  - *When to provide advice*
2. Scientific research – nutrition, physical activity, sleep and emotional health

2

### Why is this important?

- South Asian women are at a **significantly greater risk** of gestational diabetes compared with White European women (Makgoba et al., 2012).
- They are **up to three times more likely to develop some long-term health conditions** following a diagnosis of gestational diabetes compared with White women (Vounzoulaki et al. 2022).
- Healthy weight management during pregnancy can reduce the risk of gestational diabetes (Harrison et al. 2013).

3 ★

### Challenges for South Asian women

Challenges	Strategies to address these
<ul style="list-style-type: none"><li>• "I agree with that – "eat for two" because you're, end of day, you're carrying a human inside you..."</li><li>• "My Mum told me to have milk with butter in it."</li><li>• "We are not used to making diet only for yourself...Because meals are cooked, and so much fat for...everyone in the house."</li></ul>	<ul style="list-style-type: none"><li>• "But at the end I got gestational diabetes...So I think that this this thing they should talk to you about this right from the beginning..."</li><li>• "And you know, this isn't just about me, this time, this is about, you know, an unborn child and, and potentially the rest of their life if they're going to develop other conditions off the back of this or more likely to, how that's going to impact the child's life as they grow up."</li><li>• "(I)It takes a community to raise a child. So it's important that we don't just catch the...woman... We need to catch her Aunties, Uncles, Dads, you know Grandmas so that they spread the message properly."</li></ul>

4 ★

## What to include in consultations

1. Culturally tailored dietary advice
  - Copyright: Jay, 2021
  - <https://mynutriweb.com/wp-content/uploads/2021/10/Untitled-700-x-700-px.pdf>



## 2. Guidance on reading food labels and beverage consumption

- <https://www.diabetes.org.uk/guide-to-diabetes/enjoy-food/food-shopping-for-diabetes/understanding-food-labels>

### Six ways to be label savvy

Follow these tips to become expert at understanding labels in minutes

1. With traffic light labels, go for green, occasionally amber, and red only as a treat.
2. Reference intake (RI) percentages are given per portion, and indicate how much the portion contributes to the amount of calories, fat, sugars and salt an average adult should have each day. Check how much of the pack counts as a portion to avoid consuming more calories, fat and sugar than you need.
3. All **carbohydrates** raise blood glucose levels. Labels on the front don't include the amount of carbs, so check the label on the pack for the total carbohydrate, which includes carbohydrates from starchy food as well as sugars.
4. The figures for **sugars** on traffic lights are for total sugars, which doesn't tell you how much of the sugar comes from natural sources, such as fructose and how much is added, such as sucrose or glucose. Check the ingredients list – if 'sugar', 'sugar syrup', 'cane sugar', 'molasses' or anything ending in 'ose' is within the first three ingredients, this suggests the food contains more added sugar. Choose an alternative if possible, or be mindful of the portion you eat.
5. Check the  **fibre**  content on the back of pack label. If you're choosing between two similar products and one has more fibre, choose that, as we should all be consuming more fibre as part of our daily diet.
6. Check the manufacturer's definition of a portion size. It may differ from yours and be smaller than you would like! However, if you are trying to lose weight or maintain a healthy weight, it's a good idea to reduce your portions.

5

6

### 13 soft drinks ranked best to worst

We've ranked 13 popular drinks from best to worst based on their nutritional value – in particular sugar and fat. Read on to learn your best beverage choices.

#### 1. Water



Remember, moderation is key. Even water can be consumed in excess. If you're looking to lose weight, drinking water can help you feel full and burn more calories.

<https://www.bhf.org.uk/information-support/heart-matters-magazine/nutrition/sugar-salt-and-fat/sugary-drinks/soft-drinks-best-to-worst>



<https://www.bhf.org.uk/information-support/heart-matters-magazine/nutrition/sugar-salt-and-fat/free-sugars>

7

## 3. Effective strategies to manage cravings (Sandler, 2022)

### Environment

Remove craved foods from environment

Remove yourself from location of craved foods

### Healthier options

Substitute craved food with a healthier choice

Have a small portion of the craved food

Drink more water (dehydration can show up as hunger)

### Psychological

Keep busy

Use mindfulness techniques

8



## Discussing weight is *helpful* when linked with research evidence

"And if it's done tactfully and educationally, you know. You know, there's ways to say things, isn't there?"  
(Pregnant woman)

"I think there's not that much, because there is kind of this, 'of course you're bigger', therefore there's more risk', there's less like unpicking it and thinking 'okay, well specifically what is the risk?'"  
(Midwife)

9



## How to provide support

- Culturally-specific visual tools
- <https://www.bhf.org.uk/informationsupport/support/healthy-living/healthy-eating/recipe-finder?keyword=&tab=recipes&cuisine=south-asian&run=1>

10

- <https://www.diabetes.org.uk/resources-s3/2017-11/Can.pdf>

## Healthy eating for the South Asian community



11

## When to provide advice

- Antenatal group settings
- Places of worship
- Community centres

12

## Scientific research

- Quiz to test knowledge of nutrition, physical activity, sleep and emotional health during pregnancy.
  - Instant feedback on answers and signposting to information if relevant.



## Appendix 31 – Link to video and copy of postcards

The video is available in this link: <https://www.veed.io/view/54889932-eddf-435a-830a-4aeb7a00ba25?panel=share>


### Postcard for midwives (front and reverse)

**BIRMINGHAM CITY University**

**Weight gain during pregnancy**

Practical guidance to support your consultations with South Asian women

Scan the QR code to access this online



Quotations are taken from interviews and co-design workshops with midwives and pregnant women/new mothers (including those who are South Asian).

Created by Sereena Raju

**Make It Count For Women**

- Remember women's Motivation to protect their health. → "I wanted them to talk to me about...healthy eating...right from the beginning..."  
*South Asian mother*
- Provide Individualised support. → "What I usually do is see... what type of woman do I have in front of me?"  
*Midwife*
- Combine relevant tasks with discussions about weight. → "You can still have those sort of informative...chats...while you're doing other things..."  
*Midwife*
- Adopt Family-centred approaches to guidance. → "(I)t takes a community to raise a child...We need to catch her Aunties, Uncles, Dads,..."  
*Midwife*
- Use Wider sources such as traffic light labels and the South Asian Eatwell guide (referenced overleaf). → "(I)t's highlighting that fact that because it hasn't got the traffic light system, you still need to look at the contents..."  
*Midwife*

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## Useful resources

Weight is shaped by a complex range of factors. Those related to lifestyle include emotional health, sleep, physical activity and nutrition. The resources below provide some guidance on each of these.

### Emotional health

Five X More. (2022) *For Healthcare Professionals* [Online]. Available at: <https://www.fivexmore.com/healthcare-professionals>

NICE. (2016) *Quality Statement 4: Asking about mental health and wellbeing*. [Online]. Available at: <https://www.nice.org.uk/guidance/qs115/chapter/Quality-statement-4-Asking-about-mental-health-and-wellbeing>

### Sleep

National Childbirth Trust. (2021) *How to sleep better in pregnancy: 10 tips* [Online]. Available at: <https://www.nct.org.uk/pregnancy/how-you-might-be-feeling/how-sleep-better-pregnancy-10-tips>

### Physical activity

Department of Health and Social Care. (2019) *Physical activity guidelines: pregnancy and after childbirth* [Online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1054538/physical-activity-for-pregnant-women.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1054538/physical-activity-for-pregnant-women.pdf)

### Nutrition

British Nutrition Foundation. (2022) *Looking at labels* [Online]. Available at: <https://www.nutrition.org.uk/putting-it-into-practice/food-labelling/looking-at-labels/>


Public Health England. (2018) *The Eatwell Guide* [Online]. Available at: <https://www.gov.uk/government/publications/the-eatwell-guide>

Jay, F. (2021) *The South Asian Eatwell Guide* [Online]. Available at: <https://www.gov.uk/government/publications/the-eatwell-guide>

Made with Visme





## Postcard for pregnant women (front and reverse)



### Weight gain during pregnancy

Practical guidance to support your pregnancy

Scan the QR code to access this online

Quotations are taken from interviews and co-design workshops with pregnant women/new mothers (including those who are South Asian).

Created by Sereena Raju

### Experiences and facts about weight gain during pregnancy

"I did overeat, and I gained like 12 KG or something."

→ Your calorie needs will only increase by around 200 calories per day in the last three months of pregnancy (NICE, 2010).

"My mum told me to have milk with *butter* in it... It just feels like... a *huge* influx of calories."

→ Dairy products should be eaten in moderation. Aim to eat natural unprocessed foods (fresh or frozen fruit and vegetables, nuts, etc.) as much as possible and to eat less processed foods (often with a long list of ingredients you don't recognise) (Public Health England, 2018).

"Instead of just going for that biscuit... thinking 'Did I really genuinely need that at all... Is it boredom?'"

→ Some other helpful strategies to manage cravings are available in the information resources overleaf.

"I was encouraged a lot to just rest. To not do anything."


→ Aim for at least 150 minutes of moderate-intensity activity every week. This can be achieved through walking, yoga and climbing stairs (Department of Health and Social Care, 2019).

"If we were to actually have... group sessions... then we can have these conversations about... what we should (do)..."

→ Join local activities and meet-ups for pregnant women (listed overleaf). Research shows that pregnant women feel more confident about their weight management when they access group-based support.

Made with Visme

## Useful resources



- A range of factors will influence your weight gain during pregnancy.
- Those related to lifestyle include sleep and emotional health as well as nutrition and physical activity.
- Further guidance on each of these is available below.

**Sleep**  
National Childbirth Trust. (2021) *How to sleep better in pregnancy: 10 tips* [Online]. Available at: <https://www.nct.org.uk/pregnancy/how-you-might-be-feeling/how-sleep-better-pregnancy-10-tips>

**Emotional health**  
Tommy's. (2022). *Mental health and wellbeing*. [Online]. Available at: <https://www.tommys.org/pregnancy-information/im-pregnant/mental-health-wellbeing>

**Physical activity**  
Department of Health and Social Care. (2019) *Physical activity guidelines: pregnancy and after childbirth* [Online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1054538/physical-activity-for-pregnant-women.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1054538/physical-activity-for-pregnant-women.pdf)

**Nutrition**  
British Nutrition Foundation. (2022) *Looking at labels* [Online]. Available at: <https://www.nutrition.org.uk/butting-it-into-practice/food-labelling/looking-at-labels/>

Jay, F. (2021) *The South Asian Eatwell Guide* [Online]. Available at: <https://www.gov.uk/government/publications/the-eatwell-guide>

Weingus, L., & Adams, R. (2022). *How To Handle Pregnancy Cravings* [Online]. Available at: <https://www.forbes.com/health/family/how-to-handle-pregnancy-cravings/>

**Local activities**  
National Child's Trust. (2023) *Parent and baby groups* [Online]. Available at: <https://www.nct.org.uk/local-activities-meet-ups/parent-and-baby-groups>

NHS. (2023) *Find antenatal classes* [Online]. Available at: <https://www.nhs.uk/Service-Search/other-services/Antenatal-classes/LocationSearch/358>

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