

Developing inclusive care to support women to manage gestational diabetes and reduce future type 2 diabetes risk: A behavioural analysis using the COM-B model

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Abstract

Background

Poorly managed gestational diabetes mellitus (GDM) has serious implications for mother and child and women diagnosed with GDM have increased risk of type 2 diabetes (T2D). Risk is greater for women from minority ethnic groups. There is a paucity of literature exploring factors influencing related lifestyle behaviour change for GDM self-management and T2D risk reduction, especially for women from these groups. This is necessary to inform the development of inclusive, theoretically informed interventions.

Methods

Interviews were conducted with a diverse sample of 35 women (66% from minority ethnicities) who had been diagnosed with GDM. The Capability-Opportunity-Motivation (COM-B) model of behaviour was used to identify how positive engagement with gestational diabetes self-management and type 2 diabetes prevention behaviours can be supported.

Results

Barriers to GDM self-management included variable knowledge and unclear, un-tailored guidance, challenges developing glucose management skills and a cognitive overload from continuous monitoring (Capability); women felt a loss of control over pregnancy decisions and cultural beliefs (such as the risks of exercise) and dietary habits made glucose management more challenging (Motivation). Barriers to T2D risk prevention choices were primarily driven by motivational factors, such as women not feeling they were at risk and appetite drivers associated with breast-feeding (Motivation) as well as lack of clear guidance and risk determination (Opportunity). Sociocultural influences included a cultural normalisation of diabetes, and contextual factors such as housing and the local environment not being conducive to lifestyle change (Opportunity). Recommendations include, improving the communication of guidance (e.g., BCT *instruction how to perform behaviour*); fostering social interaction (e.g., BCT *social support*); and addressing lack of intention postpartum, by consistent communication at discharge, adequate presentation of personalised risk and a concise provision of guidance (e.g., BCTs *salience of health consequences*).

Conclusions

This study identifies the theoretical basis for inclusive intervention development and service design improvements to support women with GDM self-management and T2D risk reduction.

Background

Gestational diabetes (GDM) is raised blood glucose occurring during pregnancy [1]. If actions are not taken to control blood glucose, GDM can have a significant impact on mother and child, including risk of pre-eclampsia, premature birth, still-birth [1]. Furthermore, 50% of women diagnosed with GDM will subsequently develop type 2 diabetes (T2D), with a disproportionate prevalence amongst women from minority ethnic groups [1, 2]. Lifestyle change and self-management are the cornerstone of GDM care and T2D prevention [3-5]. Interventions during a GDM pregnancy [6] and postpartum [7-10] can support positive lifestyle change and self-management but there is little representation from marginalised groups generally in this research (both ethnic and socioeconomic). The pervasive nature of inequities in the provision of maternal care in the UK has been highlighted in recent reports [11, 12], with particular focus on women from ethnic minority groups who face inequalities in access and outcomes as well as racism. Developing inclusive care is a key area of UK policy focus [13]. GDM is an increasing challenge for maternal care globally and in high income countries there is a disproportionate burden upon women from minority ethnicities and those facing socioeconomic adversity [14-17]. Cultural barriers to engagement with general lifestyle guidance [18], diabetes education [19], and weight and lifestyle interventions [20, 21] are well-documented, and ensuring cultural salience of support for behaviour change has potential to improve outcomes [19].

Most women find adapting to a GDM diagnosis difficult; there are numerous reviews exploring the lived experience of GDM globally, which highlight similar themes; the shock and burden of diagnosis, loss of control, challenges with healthcare support and with changing lifestyle [22-25]. Postpartum women report other competing priorities and varying levels of understanding of future diabetes risk [23, 26]. Women from minoritised ethnic groups are poorly represented generally in this literature, and the nuanced experiences amongst women from ethnic minority groups are often not distinguished from the majority populations. Additionally, reviews focussing specifically on minority ethnicities [27, 28] synthesise findings from diverse ethnic groups such as Pacific Island, African Americans, and first nation groups – women from diverse cultures with diverse needs and supported across a range of healthcare settings. There is little representation of UK women in these

reviews and particularly poor representation of South Asian and Black African women, the two largest minority ethnic groups in the UK and European context [29]. Furthermore, to develop behaviour change interventions we need to go beyond our understanding of lived experiences, to develop a theoretical understanding of the key determinants of behaviour and what behaviour change mechanisms would be most effective to support behaviour change [30, 31] as interventions which are theoretically informed, are more likely to be effective than those designed purely empirically [32].

To support the theoretical development of behaviour change interventions Michie et al., have developed the Capability Opportunity and Motivation model of behaviour (COM-B) and Behaviour Change Wheel framework [33]. This begins with identifying the behaviour, followed by a behaviour analysis. In the COM-B model, behaviour is conceptualised to be a function of a person's **capability** (e.g. knowledge and skills), their **opportunity** to perform the behaviour (e.g. social and environmental conditions) and their **motivation** (e.g. beliefs and sub-conscious drivers). The COM-B analysis helps determine potential determinants of behaviour which may be leveraged to support behaviour change. The COM-B domains can be further sub-divided by categories borrowed from the Theoretical Domains Framework (TDF) to enhance the sensitivity of the analysis [34]. The TDF is widely used in implementation science and includes 14 domains which map onto the domains of the COM-B model [34]. In the next stage, the Behaviour Change Wheel is used to facilitate the mapping of evidence-based behaviour techniques (BCTs) to the behaviour determinants identified by the COM-B analysis.

In this analysis we aimed to explore, amongst a diverse population of UK women (White European and women from minority ethnic groups), key determinants of behaviour to support GDM self-management and T2D risk reduction postpartum to inform our theoretical understanding of where current care should be improved and how to design behaviour change interventions and services that are inclusive.

Methods

Ethical approval

This study was approved by the UK Health Research Authority under project ID 308391.

Participants and setting

Semi-structured interviews were conducted between November 2022 and March 2023, with women who had been diagnosed with GDM in the last 2 years. Recruitment was primarily from the community setting as we aimed to recruit women who may not normally access the medical research process. A researcher was embedded within Children's Centres serving diverse communities in inner city London and relationships were developed with several community charities. This strategy was supplemented by recruitment from National Health Service (NHS) settings in Bedfordshire, Norfolk, and Sussex. To obtain equal representation across key ethnicities purposive sampling was adopted towards the end of the recruitment process.

Our patient and public involvement team included two women of South Asian descent and one of White British descent. The team were involved in development of the protocol and the topic guide and gave input into data sessions during the analysis process.

Data collection

Interviews took place on-line, or face-to-face within a charity or children's centre setting or in the participant's home, depending upon participant preference. Participants received a £20 voucher for their involvement. Interviews lasted approximately 60 minutes and were structured using a topic guide informed by the literature on experiences during pregnancy and postpartum and the COM-B model. The topic guide was designed specifically for the purposes of this study and is reproduced in full in the supplementary file. Sessions were audio-recorded and transcribed. Transcripts were checked for quality against the audio files to ensure different accents were transcribed accurately. No new insights were apparent after 35 interviews, so we determined data saturation at this point [35].

Data analysis

Stage 1: Firstly, we identified the relevant behaviours supporting GDM self-management and postpartum T2D prevention. We then used the COM-B model and the TDF to inform a framework analysis of the influences on the identified behaviours and developed themes within the COM-B domains [36]. The COM-B and TDF definitions used as the coding framework are provided in the supplementary file. The coding was carried out by one researcher (AM) with the rest of the research team and other stakeholders contributing to the analysis in shared data-sessions.

The primary focus of the analysis was to map the evident factors which need to be addressed to support behaviour change (barriers). We also coded facilitators to behaviour change to help inform the choice of potential behaviour change techniques in stage 2. We considered the full dataset then explored variation by comparing the coding for participants from ethnic minority and socially disadvantaged participants to the full dataset, looking for commonalities and differences. Ethnicity was self-declared by the participants. Participants were categorised as facing socioeconomic hardship by the research team based upon their interview transcripts. For example, participants who expressed challenges with housing, history of socioeconomic hardship, or lack of resources to purchase healthy food.

Stage 2: The Behaviour Change Wheel was then used to map behaviour change techniques to each COM-B/TDF domain identified (see supplementary file for further detail) [33]. BCTs were selected based on evidence of effectiveness to support lifestyle change [37] and guidance for mapping BCTs to the TDF [34]. Further definitions of BCTs are publicly available [38].

Terminology

We use *structural influences* to refer to the political, economic and social mechanisms influencing health inequities [39]. Our definition of health literacy is informed by that of the World Health Organisation to refer to '*people's knowledge, motivation and competences to access, understand, and apply health information in order to make judgements and take decisions in everyday life*' concerning their health [40].

Reporting

This study is reported according to the COREQ guidelines (see supplementary file).

Results

Thirty-five women took part in the qualitative interviews, 66% of these were from minority ethnicities (Table 1). Forty-three percent of women were first-generation migrants from diverse countries such as Bangladesh, Pakistan, India, Nigeria and Uganda. All spoke some English; one interview was conducted with an interpreter. The majority reported tertiary education (83%).

Stage 1: COM-B Behavioural analysis

Identifying the behaviours

Four behaviours associated with management of GDM during pregnancy and 4 with postpartum T2D risk reduction were identified (Table 2).

Overview findings of the behaviour analysis

The key challenges women faced in adopting GDM self-management and post-partum T2D risk reduction behaviours are summarised in Figure 1. In GDM self-management all women struggled to develop the knowledge and skills to manage their glucose levels and lack of tailored resources and guidance left many seeking unofficial guidance online. Cultural beliefs and social norms reduced the motivation of some women to restrict their diet or engage in exercise. Some women struggled to fund necessary changes in diet. The level of personal rapport and support provided by healthcare teams played a pivotal role in women's GDM self-management success. Postpartum, women have many pressures on their time, which limits personal focus. Nevertheless, the key challenge at this stage is that most feel GDM is over and the majority do not have the identity of someone at risk of T2D, which reduces their intention to engage. Lack of personal risk data and clear guidance further increase this risk. In addition, for some women, especially in South Asian communities, high prevalence of T2D and norms around body size and weight created a sense of inevitability, which reduced motivation to change.

Themes related to management of GDM

Fifteen influences on behaviour were identified across the 4 behaviours (10 barriers, 3 facilitators and 2 mixed influence themes). These are summarised in Table 3.

Capability

Lack of knowledge about how to change the diet appropriately to manage blood glucose and how and when to exercise, together with difficulties mastering glucose testing, influenced women's ability to follow guidance (Barrier/ Psychological Capability). Education around dietary change was criticised by the most health literate, in particular, as it was considered by this group to be generic, lacking nuance about glycaemic load and out of date – *you're talking nonsense, what diabetic can sit and eat two satsumas for a snack and be OK!* Some women wanting culturally salient dietary guidance also did not always feel they knew enough about culture-specific foods from the guidance provided. Mastering the skill of eating to balance blood glucose was challenging and sometimes seemed an impossible skill to master – *I struggled even when I did everything my blood sugar would go sky rocket*. It was equally challenging to master the testing process – *I just couldn't actually take enough blood for 4 readings a day; and the high cognitive load associated with remembering to test, recording it and reporting it, organising replacement test strips etc – It's just another layer of 'I've got to remember'*. Similarly, exercise guidance was described as 'vague' or 'non-existent' and women reported having limited understanding of the role and risks of medication, which was often prescribed with little discussion.

Motivation

Overall, women were motivated to follow the guidance to do the best for their baby (Facilitator/Reflective Motivation). However, conflicting cultural beliefs around dietary norms and safety of exercising in pregnancy negatively influenced the motivation of some women of ethnic minority heritage (Barrier/Reflective motivation). For example, Black African, First generation women held beliefs that dietary restriction in pregnancy was bad for the baby and a lack of belief in the safety of exercise in pregnancy was expressed by a few women of African and South Asian heritage (n=3) – *Carrying my first-born ...I could see that maybe the exercise harm the baby*. In addition, some women carried a burden of guilt or shame around the diagnosis being their fault (Barrier/Automatic Motivation). This negatively affected their mental wellbeing and enjoyment of their pregnancy, especially when they also felt a loss of control over their pregnancy and that healthcare teams were not supportive – *I feel like too much pressure on me. Nobody looking to see how I'm dealing with it...'if you don't do it right, you're going to be put on medication'; I feel like my voice wasn't heard*.

Factors facilitating motivation included feeling healthy and emotionally boosted due to the GDM lifestyle changes and seeing your glucose readings improving from exercise (Facilitator/Reflective Motivation).

Opportunity

The lack of appropriate dietary resources and information (Barrier/Physical Opportunity) led many women to seek out unofficial information online – *I think I learnt more from the Facebook page than I did from the dietitian at the hospital*. Similarly in terms of resources, some women struggled to get

timely access to the equipment or getting hold of testing strips (Barrier/Physical opportunity) – I don't have the blood glucose monitor, nothing, I was left in limbo for two weeks. Women who were working, or who had other children found it difficult to find time to plan food and to exercise (Barrier/Physical Opportunity) –They were like 'go for a walk for an hour after lunch'. I was like but I'm working, I can't. This was even more challenging for women facing socioeconomic hardship (Barrier/Physical Opportunity) – The cost of living prices and the cost of food...it's just something else that is making it challenging.

Social factors that women found challenging were judgemental and unsupportive healthcare staff (Barrier/Social Opportunity) – *I saw one doctor and my reading was high ... I'd had two pieces of toast and she was like, "Why did you eat two pieces of toast? You should have just eaten one*, and for women of minority ethnic heritage, social pressure to eat for two and follow traditional dietary norms.

Facilitating factors included support from peers and others with GDM or diabetes (Facilitator/Social Opportunity) and use of technology and tracking devices or tools such as continuous glucose monitoring or tracking your own glucose levels on a spreadsheet (Facilitator/Physical opportunity).

Reduction of postpartum T2D risk

Eight influences on postpartum T2D risk reduction behaviours were identified, all barriers to behaviour (Table 4).

Capability

Women had little time to focus on themselves or their health which limited their ability to plan and reduced their likelihood of remembering a screening appointment (Barrier/Psychological Capability) – *your life is not your own. One minute I lived like it was my life, lived for me [now] it's not my time*. On top of this, women felt they did not have clear guidance so they were piecing together their own knowledge

(Barrier/Psychological capability) – *it would be nice to have a concrete picture rather than one I'm piecing together that may be wrong*. This was relevant across behaviours, but it was striking that lack of knowledge about annual HbA1C screening was reported by most women in this study.

Motivation

Most women did not self-identify as being at risk of T2D, limiting their intention to engage (Barrier/Reflective Motivation) – *I associate it with being much older*. However, attitudes to risk were nuanced across cultural groups; some Indian participants reported that T2D was very common and normalised – *it's not a big thing in India for the diabetes*. This either meant that women from marginalised ethnicities felt an inevitability, so were resigned to the fact or that they were particularly motivated to avoid it. The latter was associated with women with higher educational status. Women in general also had a low level of self-belief that they could eat a low glycaemic index diet long term (Barrier/Reflective Motivation).

Opportunity

Social norms around carbohydrate intake in cultural diets of ethnic minority women as well as attitudes toward body shape and size meant (Barrier/Social Opportunity) they faced even greater challenges to postpartum glucose control – *We are Bengali people.. your mum she teach you how to just eat rice, rice, rice*.

Stage 2: BCT mapping

Details of the mapping of COM-B/TDF themes to intervention functions and BCTs are included in the supplementary file. Below we discuss these potential BCTs and strategies for intervention.

Supporting engagement with GDM self-management during pregnancy

The identified BCTs which map to barriers identified in stage 1 for each pregnancy behaviour, are illustrated and summarised with practical examples of how they may be incorporated into routine care or interventions in Table 5.

Improving knowledge and skills: Barriers in knowledge and psychological skills limited engagement with self-management behaviour for most, across the behaviours, suggesting improvement in the education provision is warranted, particularly in the earlier part of pregnancy. BCTs which mapped to these domains include information about health consequences, instruction, demonstration, biofeedback, self-monitoring of behaviour/outcome of behaviour, restructure the physical environment (resources). Useful ways these BCTs may be operationalised within healthcare practice and interventions include: the provision of timely, salient, culturally tailored dietary advice and resources, including the choice of foods to feel satiated and additional information about glycaemic index and pairing for those already eating a healthy diet; information about the role of physical activity in glucose balance and activity recommendations that are safe for pregnancy; and information about the role and safety of medication.

Supporting cognitive and emotional barriers: Many women also struggled with the psychological burden of GDM and the emotional impact, making following the guidance overwhelming, especially when dealing with additional psychosocial challenges. This highlights the importance of empathetic support from healthcare teams and the potential value of peer support groups (BCTs: social support emotional/unspecified, restructuring the social environment). In addition, simple ideas to aid memory to prioritise the behaviour, especially glucose monitoring may be helpful, such as setting an alarm for 2 hours after eating as a reminder to test (BCTs: prompts and cues, associative learning).

Engaging to influence cultural barriers: Women from minority ethnic groups whose health-related lifestyle behaviours and/or beliefs were strongly influenced by cultural norms and beliefs, could be further supported by BCTs to persuade them of the importance and cultural relevance of adopting the behaviour (BCTs: *salience of health consequences, pros and cons, credible sources, social comparison*) and to provide social support to encourage this (e.g., *social support (practical/unspecified, restructuring the social environment)*). Ways of operationalising these BCTs may include engaging role models from the community to promote the behaviour and explain its importance and enable the provision of support, from other women with GDM for example. Interventions based upon these BCTs are likely to be particularly appropriate if delivered in a trusted culturally concordant setting, perhaps within the community via charities and/or faith organisations.

Providing additional support for those with increased need: Similarly, women facing socioeconomic adversity, or with a high psychosocial burden may also benefit from additional support to cope with the cognitive, practical and financial burden of GDM. The mapping indicates

the value of BCTs to enable (e.g., *restructuring the physical/social environment, prompts and cues, action planning, problem solving*). Interventions based on these BCTs may include education around planning and problem solving for behaviour change.

Supporting women to reduce longer term risk of T2D

The identified BCTs which map to barriers identified in stage 1 for each postpartum behaviour are illustrated and summarised across behaviours with practical examples of how they may be incorporated into routine care or interventions in Table 6.

Improving intention to engage: Many women lacked intention to engage in postpartum lifestyle change for T2D prevention because they did not recognise the personal risk and lacked the skills to do so. These priorities may be addressed by BCTs to educate, train and persuade (e.g., *salience of consequences, credible sources, modelling, info about health consequences, instruction on how to perform the behaviour, social comparison*). In practice these BCTs may be operationalised by improving information about postpartum lifestyle guidance following GDM, giving practical instructions and tips to help women. This is particularly relevant for White British women who were less likely to self-identify as at risk of T2D, compared to women from minority ethnicities who reported greater exposure to community T2D prevalence.

Increasing awareness of screening: Increasing awareness of HbA1C screening and its importance is also necessary, to support intention to attend (BCTs: *info about health consequences, restructuring of the physical environment (provision of resources)*). The competing pressures of caring responsibilities, recovery from pregnancy, breast-feeding and restarting work, mean that it is hard for all women to prioritise personal health behaviour. Even more so for women with additional psychosocial challenges suggesting reminders and other planning strategies could support attendance (BCTs: *prompts and cues, action planning, problem solving, restructuring the physical environment (reminders)*),

Addressing sociocultural factors: Women from minority ethnicities were more likely to self-identify as at risk of T2D than White women, but those whose health behaviour was strongly culturally influenced, faced normative pressure to revert to a high carbohydrate traditional diet. Community situated social support, such as culturally salient postpartum mums' groups and engaging the wider family are potential strategies to support behaviour change (BCTs: *restructure the social environment, social comparison, modelling, social support*). Similarly, women facing socioeconomic adversity and with additional psychosocial challenges are likely to need additional provision, such as access to safe housing and financial resources, to prioritise behaviour change and increase belief in capabilities (e.g., *salience of health consequences, restructuring of the social/physical environment, social support*).

Discussion

This study provides theoretical insight into how we can improve existing GDM support in pregnancy and postpartum T2D prevention and design future interventions to address the needs of women from diverse social and ethnic backgrounds. We have explored experiences of GDM self-management and postpartum T2D prevention, using a theoretical behaviour change framework. Our analysis suggests recommendations for supporting care within current care pathways as well as specific opportunities where further intervention may be needed for some sub-groups of women from minority ethnicities and those facing adversity.

Insights for general service improvement within the current care pathways

Dietary change is a cornerstone of GDM self-management, and the challenges associated with the provision of dietary information that is tailored towards different cultures is well documented [28, 41]. Our analysis evidenced effort to improve the cultural competency of the dietary provision, with many examples of a culturally focused provision, although it still fell short of expectations. In fact, White British women and women from minority ethnic groups wanted more tailored nuanced dietary advice. As most women were adapting generic advice via their own internet research, signposting to existing evidence-based online resources as well as developing improved interactive tailored resources is recommended to overcome the practical difficulties of providing dietary advice, tailored to different needs, within existing care pathways (BCT: *instruction how to perform the behaviour*).

Our analysis is the first to highlight the lack of emphasis, and the corresponding lack of knowledge and skills, surrounding the role and recommendations for physical activity for GDM. Given the important role activity plays in glucose management [42], suggesting improvement in the knowledge provision is warranted to meet NICE guidance [4] (BCT: *instruction how to perform the behaviour, information about health consequences*). Most published studies reinforce our findings concerning the emotional burden of GDM [23, 25, 28, 41] and some the compounding impact of feeling judged within healthcare interactions [23]. Our theoretical mapping suggests the importance of emotional support (BCT: *Support (emotional)*), highlighting the need for improved empathy within healthcare interactions and the potential value of fostering social interaction between women, within GDM education settings. Further to this, consistent with Boyd et al.,[43] our

analysis suggests some value of online peer support groups. Online and social media peer support groups have been shown to be beneficial for a range of health conditions [44-46].

Postpartum barriers around knowledge of T2D risk [27] and competing caring responsibilities [27, 43] are well documented. Parsons et al. reported the sense of postpartum abandonment many women feel post-GDM [23]. Given this was also strongly evident in our data and has been reported now for at least 10 years, the need to provide women with clear, timely information about their personal T2D risk and appropriate, clear guidance should be a pressing priority (BCT: *salience of health consequences, verbal persuasion, instruction how to perform behaviour*). In addition, there is an evident need to inform women of the value of annual screening as well as actively reminding them, for example by text (BCT: *Prompts & cues, information about health consequences*). Huang et al., reviewing interventions to increase screening uptake provide some corroboration for using reminders, and like our analysis suggest reminders in association with education would be most effective [47]. The latest meta-analysis of post-GDM lifestyle interventions to reduce T2D risk [8], which includes the largest trial to date [48], supports the effectiveness of intensive postpartum lifestyle intervention, although highlighting the challenges of supporting women to engage in the real-world setting because of competing responsibilities. Our analysis identifies a common lack of intention and knowledge/skills which are considered conditional barriers to behaviour change [49]. We suggest addressing these identified barriers through adequate and consistent communication at discharge, streamlining communication between primary and secondary care, presentation of personalised risk and a concise provision of guidance, regardless of subsequent more intensive lifestyle intervention (BCTs: *information about health consequences, instruction how to perform the behaviour, salience of health consequences, verbal persuasion, identity associated with behaviour*).

Supporting women from minority ethnicities

Our analysis suggests that some women from minority ethnicities face barriers which may be difficult to address within the current care pathways. Women who have migrated to the UK, as well as others whose health behaviour is strongly influenced by cultural beliefs and traditions, had different needs to women from minority ethnicities whose health behaviour and beliefs were more assimilated with UK culture (e.g., eating a UK centric diet and framing illness biomedically). The former face additional social opportunity and reflective motivation barriers. Lifestyle-related health behaviour is strongly influenced by the sociocultural environment [50] and other studies have suggested diabetes-related dietary guidance can conflict with cultural social norms when the traditional diet is heavily rice and carbohydrate based [18, 51, 52], particularly because of the symbolic role cultural foods can play within the family in immigrant communities [53]. Furthermore, in collectivist cultures such as African cultures, dietary decisions are family rather than individually led [51]. Similarly, strong cultural beliefs around the safety of pregnancy exercise [54, 55] and 'eating for two' [56] have been identified in African cultures. Our data suggested these women were also more likely to face stigma and isolation associated with diabetes. These barriers impact on women both during pregnancy and beyond. BCTs identified to address these issues (e.g., *social comparison, social support, restructuring the social environment, modelling, credible sources*) are likely to be most effective when operationalised in community-situated interventions as this can facilitate ethnic concordance and involve trusted community figures as role models and credible sources. There is supportive evidence to suggest that community-situated, culturally tailored interventions to support lifestyle-related change [21, 57] and diabetes education [19] can be more effective than standard care. Such interventions are often delivered in charity or faith settings [58-60]. This approach is compatible with the UK NHS long-term plan [13] to deliver services, suitable for local populations through local partnerships with voluntary community and social enterprise organisations as a strategy to address health inequalities [61].

Addressing structural barriers

Women from minority ethnicities also faced the compounding challenges of structural and psychosocial inequalities (stress, poor housing, financial barriers, depression) as well as reporting racism within their wider NHS experience. Some White British women in our sample also faced similar social barriers, so these issues are not exclusively related to ethnicity. Women facing these barriers were more likely to find the cognitive burden of GDM self-management and motivation for postpartum health, challenging. Whilst the COM-B analysis suggests BCTs to increase support and restructure the physical environment, this belies the wider complexity of these social determinants of health, which impact on diabetes prevalence and outcomes [62]. It is likely that multi-faceted policy and social change are needed to address these structural inequities.

Strengths and limitations

Our analysis is based on data collected from a socioeconomic and ethnically diverse sample, with community recruitment prioritised to capture the voices of women often under-represented in research and who particularly face inequities. This diversity facilitated an

intersectional approach to our analysis, which combined with the COM-B/Behaviour Change Wheel analysis, provides novel insights into improving service design and developing interventions which are inclusive and can help address inequities. Whilst we did offer translation support, we only conducted one interview with a non-English speaker, so the analysis is unlikely to represent the perspective of those facing language barriers. The majority of the sample reported a high level of educational attainment which may not reflect the national population. Additionally, whilst we recruited from several geographical areas, our sample was biased towards those living in London where services are already somewhat adapted to supporting ethnically diverse communities, which may limit direct transferability to less ethnically diverse geographies. We did not record objective measurement of socioeconomic status and adversity was inferred from interview accounts.

Conclusion

This study identifies the theoretically based behavioural determinants and evidence-based strategies to target them to improve the current care provision for women diagnosed with GDM, during pregnancy and postpartum. Suggested strategies include improving online individualised dietary information, signposting to and helping encourage peer support and sending postpartum screening reminders with accompanying educational information. Community-situated interventions are recommended to support a subsection of women from minority ethnic groups, whose health behaviour is strongly influenced by community norms and beliefs. Pervasive structural barriers require a multifaceted policy approach to address the wider social determinants of health, which goes beyond individual behaviour change strategies.

Abbreviations

COM-B: Capability, Opportunity, Motivation and Behaviour

GDM: Gestational diabetes mellitus

TDF: Theoretical Domains Framework

T2D: Type 2 diabetes mellitus

Declarations

Ethics approval and consent to participate: This study was approved by the UK Health Research Authority under project ID 308391. Ethics approval was granted by Yorkshire & The Humber -Sheffield Research Ethics Committee (NHS Research Authority) under REC Reference 22/YH/0124. All participants provided informed consent to participate in writing. As specified in our ethics application this research was conducted in compliance with the Declaration of Helsinki.

Consent for publication: Not applicable for this manuscript.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests

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Tables

Tables 1 to 6 are available in the Supplementary Files section.

Figures



Key Barriers to GDM self-management

Capability (e.g. knowledge, skills, memory, attention, behaviour regulation)

Opportunity (e.g. social & environmental influences)

Motivation (e.g. beliefs, intentions, emotions, goals)

- **Having the necessary knowledge & skills to perform the behaviours**
- cognitive burden associated with glucose monitoring
- Lack of access to dietary resources tailored to culture and health literacy
- Lack of funds & time to dedicate to changing behaviour & diet (esp. the most disadvantaged)
- **Unsupportive healthcare teams**
- Emotions of guilt, shame and loss of control
- Some conflicting cultural beliefs around the safety of exercising and appropriate dietary choices for pregnancy



Key Barriers to T2D prevention

- **Lack of detailed knowledge about dietary, activity & screening guidance**
- Competing caring responsibility reduces self-focus & attention
- Lack of access to clear guidance based on personal risk
- Lack of time to cook & plan
- Cultural social norms around weight & T2D acceptance
- **Lack of identity as a person at risk of T2D & limited intention**
- Lack of self-belief in ability to adopt long-term lifestyle change
- Hunger from breastfeeding overrides food choice

Figure 1

Main barriers influencing GDM self-management and post-partum T2D risk reduction behaviours (bold most commonly reported)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryFileV2.026.8.26.docx](#)
- [Tables.docx](#)