

1 **Women’s views on screening for type 2 diabetes after gestational diabetes: A**
2 **systematic review, qualitative synthesis and recommendations for increasing**
3 **uptake**

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12 A systematic review of views on screening for diabetes after GDM

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3 **CONFLICTS OF INTEREST**

4 None declared.

5 **WHAT'S NEW?**

- 6 • There is a need to increase the number of women attending glucose testing after gestational
7 diabetes. Higher attendance will enable earlier diagnosis and management of diabetes and
8 improve long-term outcomes.
- 9 • This is the first qualitative review focusing on barriers and facilitators to screening attendance.
- 10 • We found that factors could affect either mothers' motivation or opportunity to attend.
- 11 • Some influences related to the healthcare system (relationship with healthcare and logistics
12 of the appointment and test) while others were personal (concern about diabetes and family-
13 related practicalities).
- 14 • We developed ten recommendations to increase screening attendance based on the barriers
15 and facilitators identified.

16

17 **KEY WORDS**

18 Diabetes, Gestational; Diabetes Mellitus, Type 2; Postpartum Care; Glucose Tolerance Test

1 **ABSTRACT**

2 **Aims:** Many women do not attend recommended glucose testing following a pregnancy affected by
3 gestational diabetes. We aimed to synthesise the literature regarding the views and experiences of
4 women with a history of gestational diabetes on postpartum glucose testing, focussing on barriers and
5 facilitators to attendance.

6 **Methods:** We systematically identified qualitative studies that examine women’s experiences
7 following gestational diabetes relating to glucose testing (diabetes screening) or experience of
8 interventions to promote uptake of testing. We conducted a thematic synthesis to develop descriptive
9 and then analytical themes, then developed recommendations to increase uptake based on the
10 findings. We evaluated the quality of each study and the confidence that we had in the
11 recommendations using published checklists.

12 **Results:** We included 16 articles after screening 23,160 citations and 129 full texts. We identified four
13 themes of influences relating to the healthcare system and personal factors that affected both ability
14 and motivation to attend: relationship with healthcare, logistics of appointments and tests, family-
15 related practicalities, and concern about diabetes. We developed ten recommendations addressing
16 diabetes risk information and education, and changes to healthcare systems to promote increased
17 attendance at screening in this population, most with high or moderate confidence.

18 **Conclusions:** We have identified a need to improve women’s understanding about type 2 diabetes and
19 gestational diabetes, and to adjust healthcare provision during and after pregnancy to decrease
20 barriers and increase motivation for testing. Encouraging higher uptake by incorporating these
21 recommendations into practice will enable earlier management of diabetes and improve long-term
22 outcomes.

1 INTRODUCTION

2 Gestational diabetes (GDM) is an increasingly common disorder, with ~14% of pregnancies affected
3 worldwide [1]. In addition to increasing the risks of pregnancy complications that affect both mother
4 and baby, it is associated with increased risk of cardiometabolic disease after pregnancy; this is often
5 overlooked [2]. Specifically, women with GDM are eight-times more likely to develop Type 2 diabetes
6 than unaffected women [3], and this risk is highest during the first five years postpartum [4]. Along
7 with diabetes risk factors such as high body mass index and older age, maternal and pregnancy-related
8 factors such as poorer pregnancy glycaemic control that needs to be managed with insulin have been
9 suggested to further increase the risk of developing diabetes after GDM [5,6].

10 National and international guidelines recommend that pregnant women are screened for glucose
11 abnormalities at one to three months postpartum to exclude persisting diabetes [7,8]. Women should
12 then be regularly screened according to previous test results in order to monitor glucose levels and to
13 identify those at highest risk of progressing to diabetes [7,8]. Earlier detection of Type 2 diabetes and
14 effective management of 'pre-diabetes' decreases exposure to hyperglycaemia and hence reduces
15 risk of longer-term complications and all-cause mortality [9]. There is currently variation between
16 guidelines about which screening tests and schedules to use. For example, the American Diabetes
17 Association recommends using the 75g oral glucose tolerance test (OGTT) at the first postpartum test
18 followed by either a fasting plasma glucose (FPG) test, OGTT or HbA_{1c} at least every three years [7]. In
19 2015, the National Institute for Health and Care Excellence (NICE) advised that women in the UK
20 should be screened using FPG postpartum followed by annual HbA_{1c} testing, and should not be
21 routinely offered an OGTT [8].

22 Frequency of postpartum screening varies by population but remains suboptimal; many studies report
23 just 50% uptake [10–13]. Younger women with other children and of lower socioeconomic status
24 attend less frequently, particularly if they received little perinatal care or their GDM was managed by
25 diet alone [13]. Not all women who access postpartum care after GDM receive appropriate diabetes
26 screening [13]. These observations are consistent with lower long-term engagement in behaviour
27 change interventions in women with GDM compared to other populations [14], highlighting the
28 difficulty engaging this population in interventions aimed at reducing diabetes risk. A systematic
29 review of both qualitative studies and surveys found that healthcare seeking after GDM can be
30 constrained by the maternal role (meaning prioritising the needs of children and constraints
31 associated with childcare), failures of the healthcare system, and women's perspectives towards
32 testing [15]. However, only studies published up to 2013 were included and general care, rather than
33 glucose testing, was considered.

1 In light of recently-published studies about screening plus changing guidelines for gestational and Type
2 2 diabetes diagnosis and management [7,8,16–19], we have systematically synthesised the literature
3 up to September 2017 regarding the views and experiences of women with a history of GDM on
4 follow-up glucose testing. We particularly focused on barriers and facilitators to attendance.
5 Furthermore, we have developed recommendations to adjust testing protocols or inform
6 interventions for improving long-term follow-up based on the findings.

7

8 **METHODS**

9 Details of the protocol for this systematic review were registered on PROSPERO (CRD42018092386;
10 available from www.crd.york.ac.uk/prospéro).

11 Methods for the systematic search and analysis were the same as those used for a parallel review,
12 synthesising views on a healthy lifestyle after a pregnancy affected by GDM [20].

13 **SEARCH STRATEGY**

14 In brief, the search strategy shown in Table S1 was used to search CINAHL, the Cochrane Library,
15 Embase, MEDLINE and PsychINFO electronic databases. This was developed for a group of literature
16 reviews concerning GDM. There were no language or other restrictions. We also screened reference
17 lists of included studies for citations not identified by this search.

18 **STUDY SELECTION**

19 We included peer-reviewed journal articles that examine women’s experiences following GDM
20 relating to postpartum glucose tolerance testing or Type 2 diabetes screening, or experience of
21 interventions to promote screening. All qualitative and mixed methods studies were eligible. We
22 excluded studies exclusively reporting views of healthcare providers and about postpartum lifestyle in
23 order to focus on screening.

24 After removing duplicates, R.D. or R.W. assessed all titles and abstracts against these selection criteria.
25 We used an overlap of ~10% to ensure agreement between decisions. Any differences were discussed
26 with all authors and the selection criteria were refined and elaborated accordingly. R.D. and R.F. then
27 acquired full text articles and reassessed them against these criteria, again with 10% overlap.

28 **QUALITY ASSESSMENT**

29 R.F. used the Critical Appraisal Skills Programmes (CASP) checklist for qualitative research [21] to
30 assess the quality of the qualitative research in each study, with discussion with R.D. Scores of 0, 0.5

1 and 1 were awarded for answering ‘no’, ‘unclear’ and ‘yes’ to each of the ten questions. We did not
2 exclude studies based on quality in order to make use of all available information. We did, however,
3 take the quality of the studies into account when developing our themes and recommendations, and
4 assessed the contribution of lower quality studies to the findings in Tables S3 and S4.

5 **QUALITATIVE SYNTHESIS**

6 We conducted a thematic synthesis [22] with the aid of NVivo 11. Text and tables labelled as ‘Results’
7 (or equivalent) that resulted from qualitative methods were used as data. After familiarising ourselves
8 with the data, R.D. and R.F. formed a coding frame and used this to develop descriptive themes. Both
9 authors extracted and coded data, including independently coding a subset of papers at multiple
10 stages to check consistency. In the second stage, concepts were translated from one study and
11 category to another by making summaries and comparisons, and new concepts developed as
12 illustrated in Fig 1. R.D. and R.F. considered these independently, then together and finally refined the
13 analytical themes through discussion with the wider research team.

14 We have presented illustrative quotations from the original studies as part of our explanation of the
15 analytical themes to allow the primary data to be considered. We specify whether the quotations were
16 from screened or unscreened women if this was included in the primary data. We have considered
17 our perspectives on the analysis and results as clinical or non-clinical researchers based in the UK. R.D.
18 has undertaken postgraduate training in public health and completed the research as part of her
19 doctoral studies; R.F. is a medical student; R.W. is an academic general practice registrar; and S.G. and
20 J.U-S. are both academic general practitioners with qualitative research experience.

21 **RECOMMENDATIONS FOR PROMOTING SCREENING**

22 From the analytical findings, we developed recommendations that aimed to address the behaviours
23 or beliefs that hindered screening attendance and to make use of facilitators. We aligned each
24 recommendation with the standardised behaviour change technique (BCT) taxonomy (v1) to enable
25 greater consideration of the mechanism by which the recommendations could have an effect [23]. We
26 used the Grading of Recommendations Assessment, Development and Evaluation-Confidence in
27 Evidence from Reviews of Qualitative research (GRADE-CERQual) approach to evaluate our confidence
28 in each of these recommendations [24]. GRADE-CERQual considers the relevance, coherence,
29 adequacy and methodological limitations of data contributing to each recommendation, therefore
30 informing our confidence in its effectiveness.

31

32 **RESULTS**

1 We included 16 qualitative papers after screening 23,160 citations and reviewing 129 full texts (Fig 2).
2 Table 1 shows the characteristics of these studies. Two papers published by Rafii *et al.* in 2017
3 reported data from the same set of interviews but used different analysis methods [25,26]. The
4 median number of participants was 22 (interquartile range 12 to 31) and 746 postpartum women are
5 represented overall. 53% of these participants attended testing (97/184, based on seven studies
6 reporting attendance). All but one used interviews, which were most frequently conducted face-to-
7 face. Most were set in high-income countries and some recruited minority populations; where mixed
8 populations were recruited, often over half of participants were White European. Average age was
9 ~35 years (range 24 to 56 years). Where reported, the majority of each population was married; use
10 of insulin during pregnancy, family history of diabetes and being overweight were common. Views
11 towards the first postpartum test or general testing were considered and, correspondingly, data were
12 collected between six weeks and nine years after pregnancy.

13 We found most of the studies to be good quality (mean CASP score 7.6/10), as detailed in Table S2.
14 Two studies scored below 6/10 because they did not report use of rigorous qualitative methods
15 [27,28]. The value of some studies to this review (CASP question 10) was unclear or low because they
16 presented mixed results from both mothers and healthcare providers and some only had a small
17 section about testing. The relationship between the researcher and participants and ethical issues
18 were poorly considered in general.

19 Barriers and facilitators to attending screening after GDM were translated into four themes and 13
20 subthemes (underlined) that are described below. Although not discrete categories, we organised the
21 themes into quadrants according to the degree to which they related to the healthcare system or were
22 personal factors, and the degree to which they supported attendance (permissive factors) or
23 influenced attitudes towards testing (motivational factors). This is summarised in Fig 3 and the studies
24 that contributed to each theme are shown in Table S3. Influences were reported from the perspective
25 of GDM-affected participants but not all participants were influenced by each factor.

26 ***RELATIONSHIP WITH HEALTHCARE***

27 Participants' interaction with the healthcare system influenced their intentions towards screening.

28 The behaviour of clinicians could conflict with or reinforce prioritisation of screening. Pregnancy and
29 postpartum care could imply that GDM and the associated diabetes risk were not important after
30 delivery therefore there was no need for further testing. For example, the message that GDM would
31 resolve after delivery could appear inconsistent with messages about postpartum screening: "...my
32 diabetes midwife said it normally goes away after the pregnancy so I didn't get anything afterwards"

1 [29]. Women were also confused because glucose monitoring and dietary restrictions stopped
2 immediately: “I sat there in the hospital eating a big huge piece of chocolate cake...” [30]. Furthermore,
3 some clinicians had “no time” for glucose testing [31] but focused on the baby or non-diabetes
4 maternal care at postpartum appointments. On the other hand, clinicians ‘promoting’ follow-up [32]
5 helped women to understand its importance, for example, “I think that [postnatal follow-up] was
6 explained to me both pre and post that that needed to happen. It was explained by both the hospital
7 and the GP” [screened] [33].

8 Participants additionally commented on the process of booking tests. Many were surprised to discover
9 that it was their responsibility rather than doctors’ and that missed appointments were not chased.
10 They often needed to act on generic information, such as “...[the leaflet] said it was something I was
11 supposed to take care of myself...” [screened] [31]. Although many did arrange the test, some
12 considered that invitations and reminders should come from the doctors: “Well, it would be a lot
13 easier if I got a letter that said, now it’s time – like they do for that cervix cancer screening” [screened]
14 [31]; proactive clinicians encouraged attendance: “...[my doctor] even wrote it down in my insurance
15 booklet” [screened] [25]. Participants would be reassured to know that GPs were involved in this part
16 of their care because “...You tend to forget... so much occurs after the childbirth” [34]. At an extreme,
17 some women perceived that their GP did not know about routine follow-up care after GDM (“Even for
18 blood test I had to tell him I have to do a blood test for diabetes” [screened] [33]), or explicitly gave
19 incorrect advice. One participant concluded that “[GPs] don’t really understand it, GDM, at all”
20 [screened] [33].

21 In addition, continuity of healthcare was frequently discussed. Some women were distressed by lack
22 of continuity: “...You see all different [doctors] and then they didn’t have my record and... everybody
23 just seems so confused here, like they don’t know what’s going on with their patient” [attended visit]
24 [35]. Conversely, consistency in relationships meant that they knew and trusted their clinicians, and
25 could feel safe with predictable appointments: “It meant a lot to me that I didn’t have to see a new
26 person every time I was there. That would definitely have made me feel all confused – it wouldn’t
27 have been fun at all...” [31]. Fragmented care was particularly obvious between pregnancy and
28 returning to the GP postpartum, where Bernstein *et al.* referred to a ‘chasm between specialities’ and
29 ‘professional silos’ [36]. Consequently, some needed to take on the role of ‘information broker’ [33]
30 and communicate their pregnancy history with their GP; electronic medical records were not sufficient
31 [33,36]. Additionally, Bennett *et al.* reported that relationships built with administrative staff
32 facilitated follow-up: “...when I called to reschedule [the clerk]’s like, ‘Oh, I was hoping you’d bring the
33 baby so I could see him.’ So I told her I’d bring him” [screened] [35].

1 Finally, clinicians played an important role in the ability to understand diabetes risk. A lack of patient-
2 focus prevented participants from asking questions about GDM because there was only time for
3 clinicians' agenda in consultations ("She [GP] basically said don't eat any carbs, any sugar, don't eat
4 any fruit... I was sort of like a bit overwhelmed. I came home and I just cried because there is nothing
5 I can eat now..." [not screened] [33]), or because it was explained using medical terminology that they
6 could not understand [33]. Some clinicians were too keen to refer them to websites and/or leaflets.
7 Inability to learn about GDM could leave women anxious and uninformed about their risk of diabetes
8 or the need for screening. Several identified the need for "good education antenatally as well as once
9 you've had the baby [and] your brain's working again..." [32].

10 **THE APPOINTMENT AND TEST**

11 Practical aspects of both the appointment and the glucose test itself affected opportunity to attend.

12 Logistics of going to and being at the appointment could create several barriers to attendance. These
13 included the appointment time, needing to travel long distances or needing to use public transport,
14 which one participant experienced all of: "It was a long and tiring day and I was exhausted when I got
15 back home" [37]. Some factors were inherent to current OGTT procedures such as the long
16 appointment: "because it took two hours of my time I kept putting it off" [28]. Furthermore, lack of
17 health insurance or the ability to pay for testing prevented attendance: "I don't really need [testing]...
18 only because of how much it costs, since we are in a terrible financial position" [not screened] [26].

19 Women found the testing procedure unpleasant or did not understand its purpose therefore wanted
20 to avoid having to go through it. In particular, many reported that fasting then drinking a glucose
21 solution made them feel ill, and some disliked needles. Some respondents indicated that they did not
22 understand how the test worked, meaning one participant ate breakfast so had to come back another
23 time [35], and another questioned the procedure saying, "...How can you give somebody sugar to drink
24 and then you're going to have to test it? They're definitely going to find the sugar" [36]. Several
25 suggested using more pleasant tests [28].

26 **FAMILY-RELATED PRACTICALITIES**

27 Respondents reported various personal challenges to attending screening tests. As illustrated by the
28 response "...everything is about your baby..." [31], these tended to relate to children. Bernstein *et al.*
29 said that 'most women opt to plan activities around the needs of the newborn, not around the needs
30 of the medical care system' [36] therefore if the two were not compatible, they did not attend.

31 Mothers said that needing to care for their child prevented screening attendance: "I don't think there
32 was anything that made me hesitate other than, you know, life with a newborn and two other

1 children..." [38]. Several mentioned their schedules: some reported that a new baby led to a lack of a
2 schedule ("...[getting things] done happens in the window of opportunity on the spur of the moment"
3 [32]) whereas others struggled around feeding and sleep routines. Importantly, the clinic was not seen
4 to be a suitable place to wait with children or to breastfeed. Bennet *et al.* reported that few women
5 brought their children to the test [35]; when others spoke about the need to find childcare, it appeared
6 that bringing them was not considered an option (due to the anticipated challenges of the waiting
7 room and during the procedure). 'A "separate room to facilitate breast feeding, toys for kids, nappy
8 changing facilities" at the testing centres may also facilitate screening attendance' [28]. This theme
9 was more important in unusual or unexpected circumstances: "I guess [I didn't come be]cause [I was]
10 seeing the baby [at the hospital] every day... It's the only thing I did..." [not screened] [35].

11 Unsurprisingly, adapting to life with the baby was difficult and women described feeling "just tired...
12 because I'm burnt out, frustrated" [not screened] [35] and that "life is stressful. With a new baby,
13 mum gets no sleep and has no energy and... may be feeling overwhelmed" [37]. In the context of
14 "trying to get showers in and get food in is an issue right now" [screened] [35], mothers' own health
15 and arranging testing were forgotten or simply too much, although many intended to go at a later
16 date or when things were more under control ("I had no time to go... Always I tell I do it tomorrow...
17 But I do not gone again, because I have to do another duty..." [not screened] [26]).

18 Furthermore, the support that women received at home affected their ability to take time away from
19 childcare and attend testing: several mentioned that their husbands or parents had looked after the
20 children whereas others did not have this option. One participant explained that "Because of my
21 children, I cannot go out much... There is no one to keep an eye on them while I'm gone" [not
22 screened] [26].

23 Finally, the need to work presented a further barrier to attendance because women were not able to
24 take time away for the test: "I couldn't leave work because they could take it away and I knew the
25 situation I was in, I needed to work" [36], and it presented another demand on their time: "...I've been
26 running around trying to get stuff done before I go back to work" [screened] [35].

27 **CONCERN ABOUT DIABETES**

28 Lastly, participants' level of concern regarding diagnosis of diabetes was a key factor affecting
29 motivation to attend screening.

30 Some participants were unconcerned about discovering their glucose status so were not motivated to
31 attend screening. This represented apathy ("could not be bothered" and "having a slack attack" [37])
32 or a lack of urgency [33]. Others were untroubled by the possibility of a diabetes diagnosis because

1 they did not deem themselves to be at risk. One denied her diagnosis, which was outlined in her
2 medical record, saying “My glucose level was not too high. It wasn’t GDM...” [not screened] [25]. Some
3 had evaluated that they did not have diabetes due to reassuring results of self-monitoring that they
4 continued postpartum (concluding “everything is normal” [not screened] [35]) and because they felt
5 healthy or were “very careful and compliant” with lifestyle recommendations [not screened] [25].
6 Other women were unconcerned but were nevertheless tested as screening coincided with other
7 aspects of postpartum care or marked ‘closure with their care’ [35].

8 Concern regarding a diabetes diagnosis and understanding the need for management most often
9 encouraged screening. In particular, understanding the significance of diabetes was a motivator to
10 attend (“...so I am afraid of diabetes... That’s why I’m screening” [screened] [25]). This could be
11 reinforced through knowing friends and family with diabetes, or their own experience: one participant
12 considered the implications of a diagnosis very seriously, saying “...I would have to ask for counselling
13 or something to help me cope with that...” [36]. Additionally, plans for future pregnancies motivated
14 some to be tested ‘...to avoid any complications that might jeopardize her ability to do this
15 successfully’ [38]. Abnormal results of self-monitoring increased concern about diabetes risk and
16 stimulated formal screening.

17 Occasionally, women’s fear of diagnosis of diabetes discouraged screening as they tried to hide from
18 it: “It’s, like, oh my gosh, I don’t want to have it. And so, I guess, in my mind, it’s been, if I don’t get
19 checked, maybe I won’t develop it” [38].

20 **RECOMMENDATIONS FOR PROMOTING POSTPARTUM TESTING**

21 In light of the findings, we developed recommendations for approaches to encourage attendance at
22 glucose testing, both at six weeks postpartum and beyond (Table 2). These reference BCTs and are
23 directed at both women with GDM (such as ‘5.1 Information about health consequences’) and
24 clinicians or the healthcare system (such as ‘12.1 Restructuring the physical environment’) [23]. We
25 had high confidence in three, moderate confidence in six and low confidence in one
26 recommendation(s) in accordance with the GRADE-CERQual assessment; this is summarised in Table
27 2 and fully explained in Table S4.

28

29 **DISCUSSION**

30 Through a synthesis of qualitative studies, we have shown how multiple healthcare and personal
31 factors influence attendance at postpartum glucose testing after GDM. These factors could act as both
32 barriers and facilitators (although barriers were dominant in the studies we included), and some

1 influenced practical aspects whereas others affected desire or motivation to attend. Those with high
2 intention for testing may be able to overcome certain logistical barriers and attend, whereas these
3 same barriers may stop less motivated women. We focussed on postpartum testing yet several
4 influences were clearly being established during pregnancy. Accordingly, we have identified and
5 assessed our confidence in multiple approaches to increase attendance.

6 ***STRENGTHS AND LIMITATIONS***

7 We completed a rigorous literature search and qualitative synthesis as a multidisciplinary team for
8 this review. In order to minimise our bias as researchers, we discussed the analysis and used CASP and
9 CERQual checklists when evaluating the quality of studies that contributed to the synthesis and our
10 confidence in the resulting recommendations. We utilised the BCT taxonomy to describe strategies to
11 promote screening in this population. Additionally, we included perspectives from different
12 populations and healthcare systems and found influences that could be relevant to any setting. For
13 example, the cost of testing mostly related to paying for the test yet in settings with free healthcare,
14 costs associated with travel (e.g. parking charges) may be a barrier.

15 Some of the 16 papers we included were poor quality and/or only contributed a small amount to the
16 review findings. There was inevitable selection bias whereby people with stronger views were more
17 likely to participate than those without. However, participants included both women who had
18 attended screening and those that had not. Our interpretations were also limited by the data that
19 were reported: we sought to focus on attendance at screening rather than postpartum care seeking
20 more generally, but were not always able to distinguish between the two. Similarly, use of OGTT, FPG
21 or HbA_{1c} tests was not reported, although descriptions from participants suggest most were offered
22 an OGTT. Fewer studies specifically discussed how to increase screening attendance therefore our
23 recommendations were primarily suggestions of how to overcome barriers. In addition, it was difficult
24 to identify patterns in influences. For example, although some will be similar, it is likely that influences
25 will vary between the first test at six weeks postpartum and diabetes screening several years after
26 pregnancy yet it was also often unclear how long after pregnancy participants referred to. We were
27 also not able to consider individual-level interactions such as whether first-time mothers were more
28 influenced by certain factors than experienced mothers. Although participants criticised or identified
29 gaps in their care (or praised the system), the extent to which this contributed to their decision to
30 attend screening or not is not clear.

31 ***COMPARISON TO OTHER STUDIES***

32 Although we analysed the data using thematic synthesis rather than a framework-based approach,
33 the influences we identified operated in a way similar to those described in the COM-B model of

1 behaviour [39]. On one side, we identified motivational influences: emotions such as worry about
2 diabetes and relationships with healthcare. On the other side, our permissive themes could be
3 described as opportunity and capability to attend, where we consider external factors that prompt or
4 inhibit screening, and psychological and physical potential.

5 Our findings echo many of those identified by Van Ryswyk *et al.* 2015 [15]. While their review covered
6 the wider context of healthcare seeking after GDM, we were able to develop understanding
7 specifically related to postpartum testing in addition to attending appointments. For example, we
8 were able to explain their finding that “Some women felt a sense of postpartum abandonment after
9 the intensive antenatal management of their GDM...” (page 144) and how it related to postpartum
10 testing. Additionally, factors relating to time were often the most frequently reported barriers to
11 attendance in surveys [28,38,40].

12 Several of the influences that we identified were also recognised by healthcare providers, reported in
13 a literature review assessing clinicians’ views towards postpartum testing [41] and by three of the
14 studies analysed here [32,36,37]. In particular, clinicians considered that mothers should take more
15 responsibility for their diabetes risk, and they were hindered by incomplete knowledge of their
16 patients’ pregnancy history. While there is agreement that long-term follow-up should take place in
17 primary care, there is inconsistency and lack of clarity regarding responsibility for short-term follow-
18 up [41,42]. In line with many clinical guidelines, one survey found that primary care was GPs’ and
19 mothers’ preferred place for postpartum testing [40], yet others reported that if a postpartum test
20 ordered by obstetric care was positive, the patient would have been discharged by the time the result
21 was received and secondary care would be unable to follow-up [36].

22 **IMPLICATIONS**

23 An important aspect of many of the recommendations is developing women’s understanding of both
24 the necessity and procedure of screening therefore increasing capability and motivation. Positively,
25 many report awareness of the risk of developing Type 2 diabetes [29,31,33,34,36,38] but this did not
26 always sufficiently impact on screening attendance. We therefore suggest reinforcing the following
27 key messages to address different perspectives and promote screening, without false assurance or
28 exaggerated concern:

- 29 1. Having had GDM means you are at a higher risk of developing of Type 2 diabetes, which
30 is a serious condition (addressing apathy);

- 1 2. We want to diagnose diabetes early (apathy) but, typically, it is initially asymptomatic so
2 formal testing is needed. This differs from the glucose monitoring in pregnancy (self-
3 testing reassurance);
- 4 3. We can manage diabetes effectively through medication and changes to lifestyle. Early
5 diagnosis improves long-term outcomes (fear) and knowing your diagnosis enables
6 proactive management of your health (using proactiveness);
- 7 4. Blood glucose control usually returns to normal after delivery but this needs to be checked
8 postpartum as part of routine GDM follow-up (informing risk perception);
- 9 5. Diabetes can affect subsequent pregnancies (tested for other reasons).

10 Since sharing this information is already included in many guidelines about diabetes, communication
11 must be optimised to increase understanding. It could be provided as a guide through and beyond
12 GDM using specifically developed wording. It could refer back to experiences from pregnancy in order
13 to improve relatability and understandability (e.g., postpartum testing could be described in relation
14 to pregnancy OGTTs). This information could be available to pregnant women and their clinicians in
15 order to reduce fragmentation of care and confusion over who is responsible for testing.

16 Additionally, we suggest several changes to healthcare provision that may increase screening. Aside
17 from improving clinicians' awareness of agreed protocols, steps could be taken to adapt usual practice
18 to remove some barriers to screening. Systematic reviews have found that reminders and recall
19 systems, such as phone calls or letters to both mothers and GPs, are associated with higher uptake of
20 screening than usual care [10,11]. However, a recent evaluation from the Australian National
21 Gestational Diabetes Register, a much larger cohort, suggested that mail outs had negligible impact
22 on postpartum and annual follow-up [43]. While the reasons for this warrant investigation, the
23 authors suggest that more personalised, local invitations might be more effective than national recall.
24 Furthermore, one study reported mothers' preference for electronic reminders, particularly text
25 messages (sent by the study team) [44]. Clinicians also had positive views towards reminders [41] and
26 some advise their patients to have a blood test in the month of their child's birthday [personal
27 communication]. It should be considered whether combining glucose testing with other
28 appointments, such as newborn check-ups, child vaccination schedules or cervical cancer screening in
29 the long-term, could be both manageable for general practice and offer benefits to women.

30 Our qualitative synthesis also supports the need for further consideration of more acceptable
31 screening tests due to the length and inconvenience of the OGTT and the need to fast then sugar load.
32 The HbA_{1c} test is an accurate measure of chronic glycaemia in the general population that requires
33 one non-fasting blood sample [45] although it is not suitable for use shortly after pregnancy and

1 questions about its sensitivity remain [46,47]. Similar to the change in the NICE guidelines in 2015 [8],
2 recent guidelines in Australia and New Zealand have recommended HbA_{1c} testing after the
3 postpartum period. Small-scale analyses suggest that HbA_{1c} testing can have a higher uptake than
4 OGTTs, yet uptake remains suboptimal in the long-term [48,49]. Our findings provide additional
5 evidence that this could reduce some motivational barriers to screening and make it easier to
6 complete alongside other tests or appointments. In addition, novel strategies such as very early
7 postpartum testing (e.g. before leaving hospital) could be considered. Although less accurate than a
8 test at six weeks, very high uptake can be achieved and therefore high-risk women can be identified
9 for targeted follow-up [50]. Further research over longer periods is needed to evaluate the benefits
10 and harms of increased use of other tests.

11 **CONCLUSION**

12 After a pregnancy with GDM, difficulties associated with attending appointments and a focus on the
13 family can affect women's ability to attend glucose testing postpartum and in the long-term. Concern
14 about risk of developing diabetes and experiences of healthcare can increase or limit intentions
15 towards testing. Alongside clearer education about GDM, we have suggested that amendments to
16 healthcare provision during and after pregnancy will decrease barriers to testing. Higher uptake will
17 enable earlier management of diabetes and improve long-term outcomes.

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1 **Table 1: Characteristics of the studies included in the qualitative synthesis**

Study (first author and year)	Sample size (n screened)	Setting (country)	Screening considered	Study aim(s) relevant to this analysis	Recruitment method	Participant inclusion criteria	Method of data collection	Time of data collection ¹	CASP rating (/10)
Soares 2006 [27]	56 (unclear)	Brazil	First postpartum programme visit (up to 60 days)	Discuss prevention of T2D after GDM	Women who were part of a hospital-based diabetes care programme	hGDM 1997–2003, controlled fasting glycaemia >95 mg/dL during gestation or >2 T2D risk factors, live in Metropolitan Region of Belo Horizonte	Interviews	3–9 years postpartum	3.5
Bennett 2011 [35]	22 (6)	US	First postpartum OGTT	Explore experiences, perspectives, and perceived barriers to and facilitators of postpartum follow-up care after GDM	Consecutive sampling of women in third trimester from high-risk obstetric clinic	hGDM, English-speaking, insurance coverage during and beyond postpartum visit	Face-to-face and telephone interviews	6–8 weeks postpartum	8.5
Sterne 2011 [28]	88 (47)	Australia	First postpartum OGTT	Examine barriers, facilitators and potential facilitators to attendance at postpartum diabetes screening after recent GDM	Identified from a hospital database	GDM outpatient care at Logan Hospital, Meadowbrook, Queensland 2006–2007, ≥18 years old, no history of T1D or T2D	Telephone interviews	~1.5–3 years postpartum	5.5
Lie 2013 [29]	35 (NR)	UK	First postpartum OGTT and annual testing	Explore views on postnatal lifestyle change to prevent T2D to inform development of intervention approaches	Purposive then theoretical sampling (contacted by diabetes obstetric clinic staff while attending appointments or from hospital records)	hGDM within 2 years, English-speaking, ≥16 years old, successful pregnancy outcome, received antenatal care at specified sites, able to consent	Face-to-face interviews	Within 2 years postpartum	8.0

Abraham 2014 [30]	10 (3)	US	General screening after GDM	Explore lived experiences of women in rural communities with GDM and gain insight into low screening rates	Purposive sampling and a snowball approach via obstetric and healthcare-provider offices	hGDM within 5 years, ≥18 years, reside in a county eligible for rural community grants, not since developed T2D	Interviews (face-to-face and telephone)	Between 2 and 5 years	7.0
Morrison 2014 [51]	393 (NR)	Australia	General screening after GDM	Describe reflections on the experience of GDM-pregnancy	Identified from NDSS database and contacted by mail	hGDM within 3 years, ≥18 years old at time of registration, not residing in a Queensland postcode ²	Questionnaire with free text open-ended questions	Within 3 years postpartum (mean 1.8±0.7)	6.5
Paez 2014 [38]	22 (17)	US	First postpartum OGTT/FPG and annual testing	Explore what helps and hinders diabetes testing after GDM	Women not tested and those that were tested as part of ADAPT, recruited from a multispecialty group medical practice after a GDM pregnancy from medical records	GDM in most recent pregnancy, ≥18 years old, patients of HVMA, no history of T1D or T2D, internet/telephone access, no significant mental health disorders, physician approved participation	Survey and telephone interviews	6 months–4.5 years postpartum	8.0
Kilgour 2015 [33]	13 (7)	Australia	First postpartum OGTT	To explore and assess women's communication experiences of postnatal GDM follow-up, and interpret them with CAT	Theoretical sampling from clinics and wards at a major maternity tertiary referral hospital	hGDM, shared maternity care	Face-to-face ³ interviews	12–16 weeks postpartum	9.0
Nielsen 2015 [31]	7 (7)	Denmark	General screening after GDM	Understand experience of GDM care and how this influenced participation in follow-up screening	Random selection of women with previous GDM eligible at Aalborg University Hospital	hGDM 2010–2012, first GDM pregnancy, representative of the hospital registered population	Face-to-face interviews	1–2 years postpartum	10.0

Bernstein 2016 [36]	27 (NR)	US	General screening after GDM	Barriers and facilitators to testing and referral to testing (four domains: intervention attributes, individual characteristics, inner context and outer context)	Convenience sample of women in an urban safety net hospital in third trimester	In third trimester of a GDM pregnancy	Face-to-face interviews	10–14 weeks postpartum	6.5
Campbell 2017 [37]	7 (NR)	Australia	General screening after GDM	Enablers and barriers influencing screening after GDM in Australian Indigenous women and how screening might be improved	Recruited by health service staff and project flyers in waiting area of health service	hGDM, Indigenous	Face-to-face interviews	<5 years for 4 women, >5 years for 3 women	9.0
Pennington 2017 [32]	16 (NR)	Australia	General screening after GDM	Investigate factors influencing engagement with diabetes preventative care (barriers and enablers)	Purposive sampling (approached or advertisements at general practices and MCHN centres)	hGDM	Face-to-face and telephone interviews	NR	8.0
Rafii 2017 a and b [25,26]	22 (unclear ⁴)	Iran	First postpartum OGTT/FPG	Explore Iranian women's experiences of on obstacles of postpartum diabetes screening	Purposeful then theoretical sampling from (governmental and private) hospital records after GDM	GDM diagnosis by hospital records, delivered >6 months before interview	Face-to-face interviews	Mean 11.9 ± 4.8 months postpartum	7.5 and 9.5, respectively
Svensson 2017 [52]	5 (NR)	Denmark	General screening after GDM	Examine the experience of transition from a GDM-affected pregnancy to postpartum	Random sampling (sent invitation letters via the hospital patient registry and telephoned)	hGDM, recently delivered at the hospital	Face-to-face interviews	Between 3 and 5 months postpartum	7.5

Zulfiqar 2017 [34]	23 (unclear ⁵)	Australia	First postpartum OGTT and annual testing	Explore barriers and facilitators to following long-term healthy lifestyle recommendations, and whether there were differences between overseas-born- and Australian-born-women	Women managed by a hospital DIP Service who attended a GDM-related health education programme	hGDM, English-speaking, live singleton delivery, not pregnant or since developed T2D	Face-to-face interviews	More than 3 years postpartum	7.5
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1 ¹ In reference to/since GDM pregnancy; studies collected data once postpartum unless otherwise specified; ² Due to a concurrent study; ³ Face-to-face interview is
2 implied; ⁴ Rafii 2017a reported 10/22 while Rafii 2017b reported 11/22 attended screening; ⁵ 'Almost all' had 6 weeks, 'most' had first year, 'few' had second year
3 tests.

4 ADAPT: Avoiding Diabetes After Pregnancy Trial, CASP: Critical Appraisal Skills Programme checklist, DIP: Diabetes in Pregnancy, FPG: fasting plasma glucose, (h)GDM:
5 (history of) gestational diabetes, HVMA: Harvard Vanguard Medical Associates, MCHN: maternal and child health nurse centres, NDSS: National Diabetes Service
6 Scheme, OGTT: oral glucose tolerance test, T1D: type 1 diabetes, T2D: type 2 diabetes.

1 **Table 2: Ten recommendations for promoting postpartum glucose testing after gestational**
 2 **diabetes, and our confidence in each recommendation made using the GRADE-CERQual**
 3 **approach**

Recommendation	Behaviour change techniques relating to recommendation [23]	Confidence in evidence and explanation
Relationship with healthcare		
1. Educate clinicians to, and how to, promote screening throughout GDM and subsequent care	1.1 Goal setting (behaviour), 4.1 Instruction on how to perform the behaviour, 9.1 Credible source	High: Lack of information (during pregnancy and postpartum) and seemingly conflicting advice about postpartum screening from clinicians were clearly reported, while the opposite encouraged screening
2. Implement recall systems for postpartum testing from general practice or obstetric care, and send reminders to non-responders/for missed appointments	1.4 Action planning, 1.6 Discrepancy between current behaviour and goal, 2.2 Feedback on behaviour	High: Benefits or anticipated benefits of invitations and reminders were reported in many studies
3. Establish standard protocols for communicating gestational diabetes history within the healthcare system	12.5 Adding objects to the environment [<i>for clinicians only</i>]	Moderate: There was a clear need to ensure sharing of patient history within the healthcare system, which would improve follow-up care; one benefit may be improved screening uptake
4. Promote patient-centred approaches to care in order to facilitate building relationships and opportunities to ask questions	4.1 Instruction on how to perform the behaviour [<i>for clinicians only</i>], 9.1 Credible source	Moderate: Improving experience of care would make it more pleasant and may improve screening attendance (directly or indirectly)
The appointment and test		
5. Make clinics more child and nursing-friendly, and encourage mothers to bring children to appointments	1.4 Action planning, 12.1 Restructuring the physical environment, 12.5 Adding objects to the environment	Moderate: It is clear that clinics/long appointments are not considered suitable places to bring children but how to improve this was rarely discussed in the studies
6. Seek innovative, personalised options to make it easier for hard-to-reach women to attend testing (eg. drop-ins, alternative locations)	12.1 Restructuring the physical environment	Moderate: Too inconvenient appointments discouraged testing but the studies did not clearly suggest alternatives
7. Utilise more pleasant, less time-consuming testing procedures and protocols	None	Moderate: OGTTs discourage screening; a shorter test without fasting or a glucose drink is desired and may increase uptake
Personal and family-related practicalities		
8. Schedule postpartum glucose testing to coincide with other postpartum check-ups (both mothers' and children's appointments)	10.5. Social incentive, 10.7. Self-incentive	Low: Glucose tests were difficult to attend; it is assumed that combing them with appointments that women are more motivated to attend would facilitate attendance
Concern about diabetes		

9. Educate women about the purpose of screening and how the procedure works	4.1 Instruction on how to perform a behaviour, 5.1 Information about health consequences	High: Often knowledge of the purpose of screening increased attendance; apathy and fear of diagnosis were barriers but could be reduced through education
10. Educate women that postpartum self-testing, behaviour compliance or one negative test result is not sufficient to rule out T2D in the long term	5.1 Information about health consequences	Moderate: Many studies explored how postpartum self-testing influenced concern about diabetes; education that this is not sufficient to rule out diabetes could increase screening attendance

1 *GDM: gestational diabetes; OGTT: oral glucose tolerance test; T2D: type 2 diabetes.*

1 **FIGURE CAPTIONS AND FOOTNOTES**

2 **Figure 1: Example of the development of the analytical theme “Relationship with healthcare” within**
3 **the thematic synthesis**

4 *Not all codes were presented for simplicity.*

5 *GDM: gestational diabetes; T2D: type 2 diabetes.*

6

7 **Figure 2: PRISMA diagram showing number of studies included at each stage of the literature review**

8 ** Two of these publications report the same set of interviews using different approaches to the analysis.*

9

10 **Figure 3: Summary of the themes and subthemes of influences on attendance at postpartum glucose**
11 **testing after gestational diabetes**

12 *GDM: gestational diabetes; T2D: type 2 diabetes.*

13

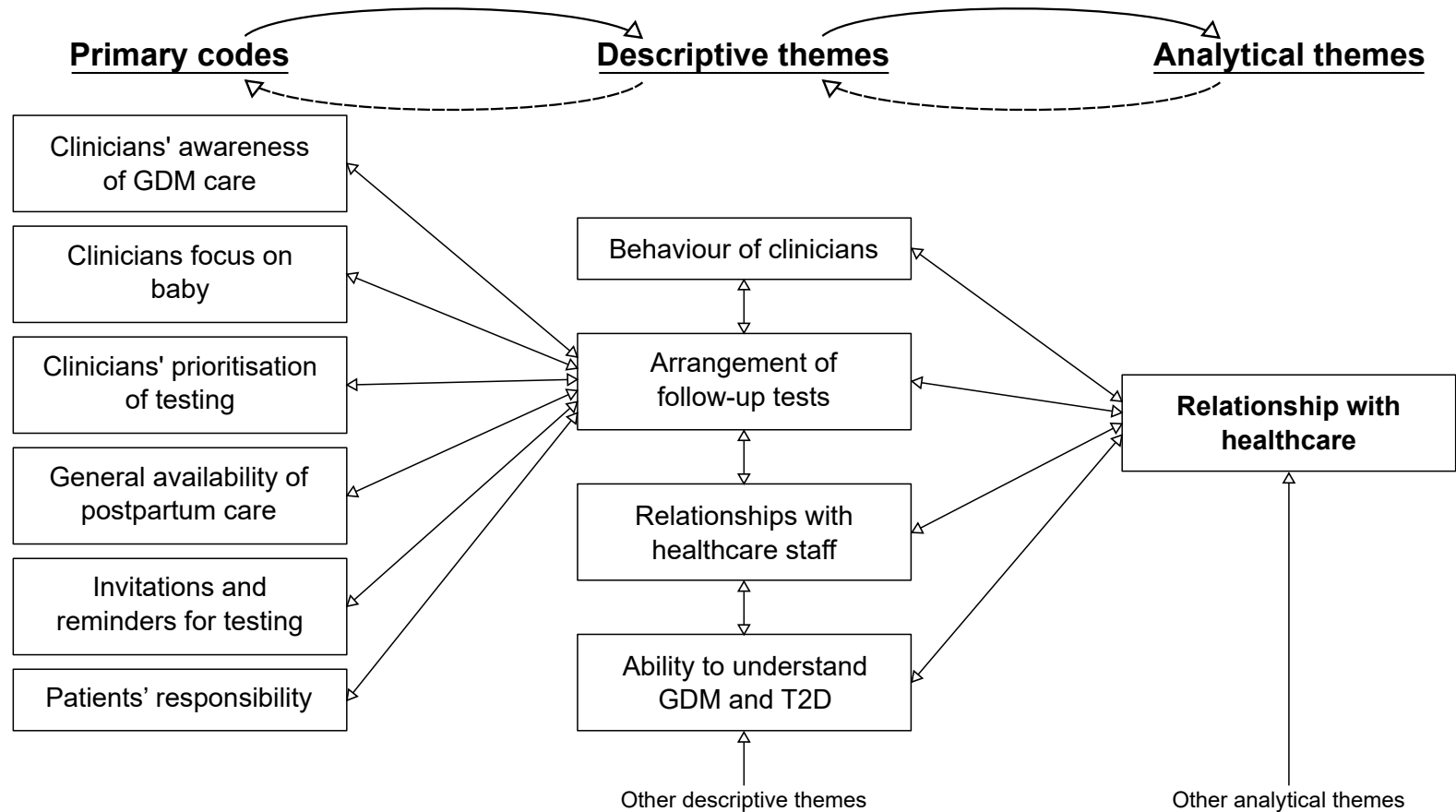
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15 **APPENDICES**

16 **Supplementary file**

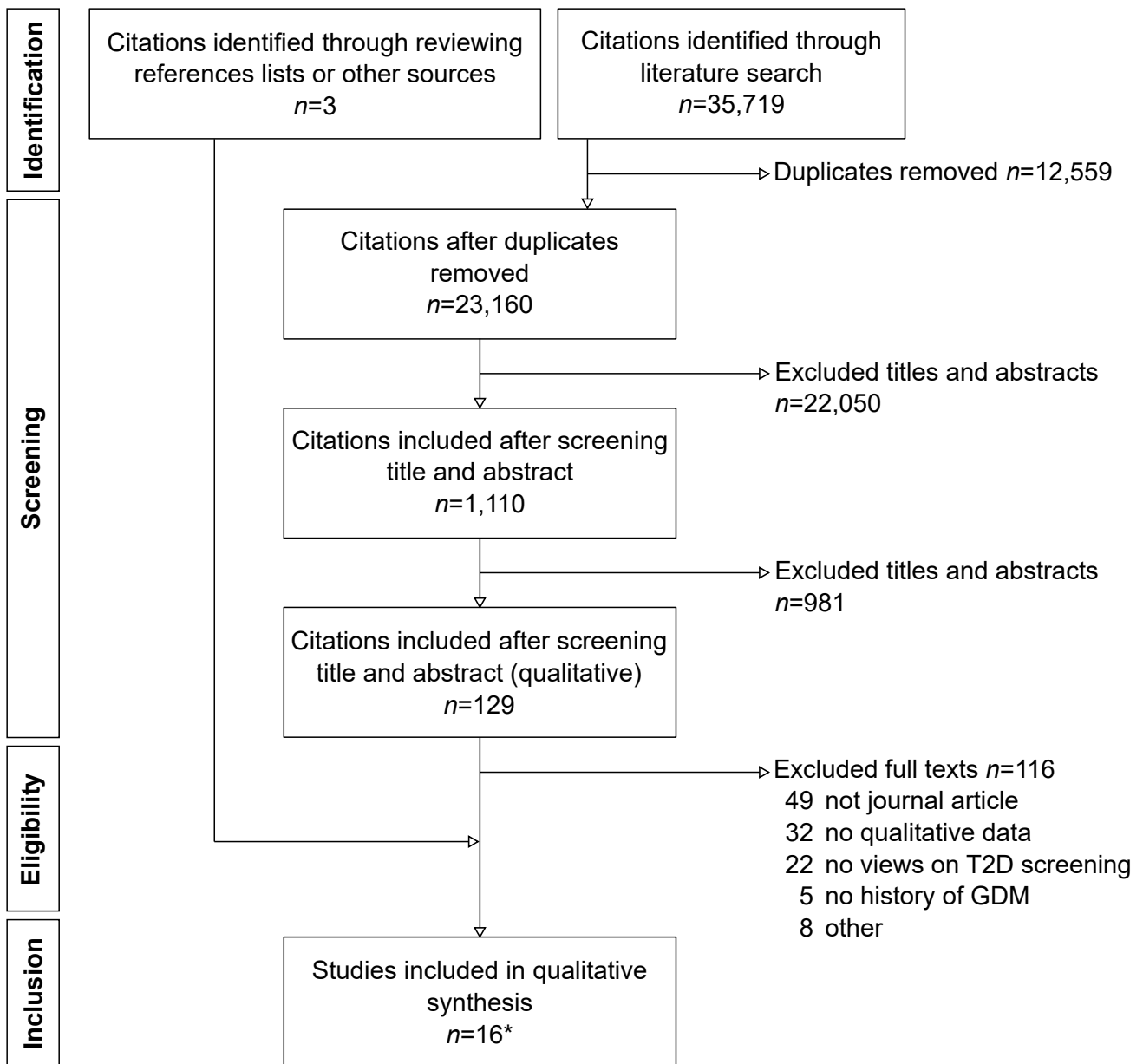
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- 18 • Table S1: Medline search strategy
 - 19 • Table S2: Findings from the Critical Skills Appraisal Programme (CASP) checklist
 - 20 • Table S3: Studies contributing to each theme
 - 21 • Table S4: CERQual qualitative evidence profile of recommendations for promoting attendance
at diabetes screening after gestational diabetes

Figure 1: Example of the development of the analytical theme "Relationship with healthcare" within the thematic synthesis



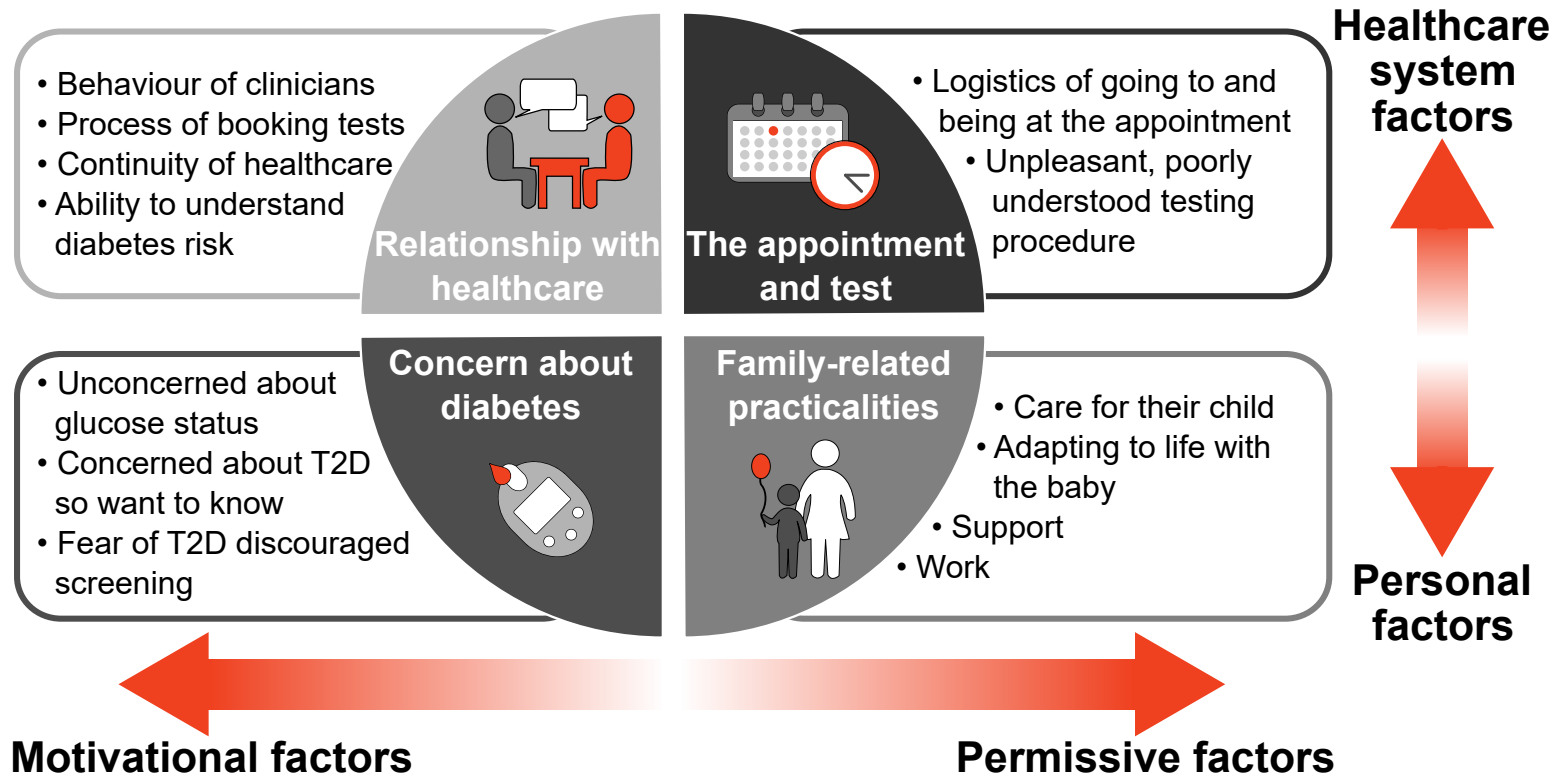
*Not all codes were presented for simplicity.
GDM: gestational diabetes; T2D: type 2 diabetes.*

Figure 2: PRISMA diagram showing number of studies included at each stage of the literature review



* Two of these publications report the same set of interviews using different approaches to the analysis.

Figure 3: Summary of the themes and subthemes of influences on attendance at postpartum glucose 10 testing after gestational diabetes



GDM: gestational diabetes; T2D: type 2 diabetes.

Supplementary material

SUPPLEMENTARY TABLE 1: Medline search strategy

1. type 2 diabetes.mp. or Diabetes Mellitus, Type 2/
2. T2DM.mp.
3. NIDDM.mp. or Diabetes Mellitus, Type 2/
4. non insulin dependent diabetes.mp.
5. glucose tolerance.mp.
6. insulin resistance.mp. or Insulin Resistance/
7. 1 or 2 or 3 or 4 or 5 or 6
8. gestational diabet*.mp.
9. diabetes in pregnancy.mp.
10. Pregnancy/ or pregnancy.mp.
11. type 2 diabet*.mp.
12. 10 and 11
13. gestation*.mp.
14. 11 and 13
15. postpartum diabet*.mp.
16. postpartum.mp. or Postpartum Period/
17. 8 or 9 or 12 or 14 or 15 or 16
18. prevent*.mp.
19. progress*.mp.
20. develop*.mp.
21. advanc*.mp.
22. incidence.mp. or Incidence/
23. avoidance.mp.
24. prohibit.mp.
25. establish.mp.
26. health promotion.mp. or Health Promotion/
27. Exercise/ or exercise.mp.
28. active living.mp.
29. metformin.mp. or Metformin/
30. weight.mp. or "Weights and Measures"/
31. risk factors.mp. or Risk Factors/
32. Insulin/ or insulin.mp.
33. exercise therapy.mp. or Exercise Therapy/
34. intervention.mp.
35. interven*.mp.
36. yoga.mp. or Yoga/
37. postnatal.mp.
38. diet.mp. or Diet/
39. healthy eating.mp. or Healthy Diet/
40. behaviour.mp.
41. physical activity.mp. or Exercise/
42. lifestyle.mp. or Life Style/
43. manag*.mp.
44. screening.mp. or Mass Screening/
45. hypoglycaemic agents.mp.
46. hypoglycaemics.mp.
47. health promotion.mp. or Health Promotion/
48. medication.mp.
49. medical therapy.mp.
50. rate.mp.
51. predictor*.mp.

52. risk*.mp.
53. factor*.mp.
54. 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53
55. follow-up.mp.
56. postpartum.mp. or Postpartum Period/
57. qualitative.mp.
58. Interview/ or interview.mp.
59. focus group*.mp.
60. health service.mp. or Health Services/
61. belief*.mp.
62. opinion*.mp.
63. survey.mp.
64. 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63
65. 7 and 17 and 64

SUPPLEMENTARY TABLE 2: Findings from the Critical Skills Appraisal Programme (CASP) checklist

Study	1. Clear statement of aims?	2. Qualitative methodology?	3. Appropriate research design?	4. Appropriate recruitment strategy?	5. Suitable data collection?	6. Researcher-participant relationship considered?	7. Ethical issues considered?	8. Rigorous data analysis?	9. Clear findings?	10. Valuable to us?	Score (/10)
Soares 2006	●	●	●	●	●	●	●	●	●	●	3.5
Bennet 2011	●	●	●	●	●	●	●	●	●	●	8.5
Sterne 2011	●	●	●	●	●	●	●	●	●	●	5.5
Lie 2013	●	●	●	●	●	●	●	●	●	●	8.0
Abraham 2014	●	●	●	●	●	●	●	●	●	●	7.0
Morrison 2014	●	●	●	●	●	●	●	●	●	●	6.5
Paez 2014	●	●	●	●	●	●	●	●	●	●	8.0
Kilgour 2015	●	●	●	●	●	●	●	●	●	●	9.0
Nielsen 2015	●	●	●	●	●	●	●	●	●	●	10.0
Bernstein 2016	●	●	●	●	●	●	●	●	●	●	6.5
Campbell 2017	●	●	●	●	●	●	●	●	●	●	9.0
Pennington 2017	●	●	●	●	●	●	●	●	●	●	8.0
Rafii 2017a	●	●	●	●	●	●	●	●	●	●	7.5
Rafii 2017b	●	●	●	●	●	●	●	●	●	●	9.5
Svensson 2017	●	●	●	●	●	●	●	●	●	●	7.5
Zulfiqar 2017	●	●	●	●	●	●	●	●	●	●	7.5
Score frequency	Yes	15	15	13	11	12	2	6	10	13	5
	Unclear	1	1	3	5	3	3	10	4	2	7
	No	0	0	0	0	1	11	0	2	1	4

Green dot: yes (1 point); yellow dot: can't tell/unclear (0.5 points); red dot: no (0 points)

SUPPLEMENTARY TABLE 3: Studies contributing to each theme

Study	CASP score	Relationship with healthcare				Appointment and test		Family-related practicalities				Concern about diabetes		
		Behaviour of clinicians	Process of booking tests	Continuity of healthcare	Ability to understand diabetes risk	Unpleasant, poorly understood testing procedure	Logistics of the appointment	Care for their child	Adapting to life with the baby	Work	Support	Unconcerned about glucose status	Concerned about T2D so want to know	Fear of T2D discouraged screening
Soares 2006	3.5		◦				◦		◦					
Bennet 2011	8.5			●			○	●	●	●	●	●	●	●
Sterne 2011	5.5	•	•		•	•	•	•	•		•	◦	•	◦
Lie 2013	8.0	●	●									○	○	○
Abraham 2014	7.0	•		◦	•							◦	◦	
Morrison 2014	6.5	•												
Paez 2014	8.0	●	●	○		○	●	○	●	○	●	●	●	●
Kilgour 2015	9.0	●	●	●	●		○	○	○			○	○	
Nielsen 2015	10.0	●	●	●	●				●			●	●	
Bernstein 2016	6.5			•	◦	•	•		•	•	•	◦	•	
Campbell 2017	9.0			●	●		●	○	●		○	●	○	
Pennington 2017	8.0		●	●	○	●	○		●			○		
Rafii 2017a	7.5		○		●	○	●	●			○	●	○	●
Rafii 2017b	9.5		●		●				○			●	●	○
Svensson 2017	7.5	○	●	○	●									
Zulfiqar 2017	7.5	○	○									●	●	

Large dot: CASP score ≥8.5, medium dot: 7.5–8.0 (median=7.75), small dot: ≤7.0.

Open dots indicate where a study briefly contributes to the theme, or lists the theme

SUPPLEMENTARY TABLE 4: CERQual qualitative evidence profile of recommendations for promoting attendance at diabetes screening after gestational diabetes

Objective: To systematically synthesise the literature focussing on the views of women with a history of GDM on attendance at postpartum glucose testing								
Perspective: Views, experiences and ideas of any women who have had GDM during any previous pregnancy								
Included studies: Studies that examine women's postpartum experiences following GDM relating to attendance at postpartum glucose testing								
Review recommendation	Studies directly contributing to the recommendation	Assessment of methodological limitations	Assessment of relevance	Assessment of coherence	Assessment of adequacy	Overall CERQual assessment of confidence	Explanation of CERQual assessment	
Relationship with healthcare								
1	Educate clinicians to, and how to, promote screening throughout GDM and subsequent care	Abraham, Campbell, Kilgour, Lie, Morrison, Nielsen, Paez, Rafii a, Sterne, Svensson, Zulfiqar	Minor concerns: the highest quality studies contributed most to informing this recommendation	Minor concerns: these findings addressed attitudes towards screening (rather than general healthcare seeking, which was also sometimes considered)	Minor concerns: for many participants, clinicians played the key part in forming views toward screening	Minor concerns: several studies discussed in detail how women interpreted (lack of) information and others more briefly mentioned this idea	High confidence	Lack of information (during pregnancy and postpartum) and seemingly conflicting advice about postpartum screening from clinicians were clearly reported, while the opposite encouraged screening
2	Implement recall systems for postpartum testing from general practice or obstetric care, and send reminders to non-responders/for missed appointments	Kilgour, Lie, Nielsen, Paez, Pennington, Rafii a, Rafii b, Sterne, Zulfiqar	Minor concerns: the highest quality studies contributed most to informing this recommendation	No or very minor concerns: these findings clearly addressed attitudes towards arranging the screening test (rather than general healthcare seeking, which was also sometimes considered)	Minor concerns: invitations from clinicians were reported positively; participants wanted reminders; many took control of arranging tests but reported this negatively	Minor concerns: several studies discussed arranging tests: the majority discussed difficulties when they didn't receive support but some discussed invitations and reminders helping	High confidence	Benefits or anticipated benefits of invitations and reminders were reported in many studies
3	Establish standard protocols for communicating gestational diabetes history within the healthcare system	Bennett, Bernstein, Campbell, Kilgour, Nielsen, Svensson	Minor concerns: four high and two good quality studies contributed to this recommendation; two studies considered the researcher-participant relationship so this may have influenced the discussion about the healthcare system in the others	Minor concerns: these findings were relevant to postpartum follow-up including screening	Moderate concerns: six studies clearly discussed fragmented care and women as information brokers, which lead to postpartum abandonment and getting lost between specialities; one explained how this discouraged screening attendance	Moderate concerns: data regarding women's discussion of continuity of care were rich but explanations on the consequences for screening were sparse	Moderate confidence	There was a clear need to ensure sharing of patient history within the healthcare system, which would improve follow-up care; one benefit may be improved screening uptake
4	Promote patient-centred approaches to care in order to facilitate building relationships and opportunities to ask questions	Links to healthcare provision in general; specifically Abraham, Bennett, Campbell, Kilgour, Nielsen	No or very minor concerns: the studies that directly contributed to this recommendation were the highest quality	Minor concerns: these findings were relevant to postpartum follow-up including screening	Moderate concerns: it is clear and logical that patient-centred care improves healthcare experience but less clear from these studies that screening attendance would increase as a result	Moderate concerns: few studies contributed directly to this recommendation, however, all of the studies that discuss the healthcare system inform patient-centred care in some way	Moderate confidence	Improving experience of care would make it more pleasant and may improve screening attendance (directly or indirectly)
The appointment and test								
5	Make clinics more child and nursing-friendly, and encourage mothers to bring children to appointments	Bennett, Kilgour, Paez, Rafii a, Sterne	Moderate concerns: four studies were very high quality but Sterne contributed most to this theme and had many methodological limitations	Minor concerns: these findings were relevant to postpartum follow-up and screening appointments	Moderate concerns: it was clear that many women did not consider taking the baby to the appointment so struggled to go if they couldn't find childcare; some participants suggested improving clinic environments	Moderate concerns: data about the need for childcare were rich, but there were fewer data about changing clinic environments and bringing children	Moderate confidence	It is clear that clinics/long appointments are not considered suitable places to bring children but how to improve this was rarely discussed in the studies
6	Seek innovative, personalised options to make it easier for hard-to-reach women to attend testing (eg. drop-ins, alternative locations)	Bennett, Bernstein, Campbell, Paez, Rafii a, Rafii b, Sterne	Minor concerns: several high quality studies contributed most to informing this recommendation	Minor concerns: these findings were relevant to postpartum follow-up and screening appointments	Moderate concerns: how easy/convenient it was to attend the test affected uptake, highlighting this as an area for improvement; one study suggesting home testing	Moderate concerns: data about the inconvenience of testing were rich but how to improve it was rarely reported	Moderate confidence	Too inconvenient appointments discouraged testing but the studies did not clearly suggest alternatives

7	Utilise more pleasant, less time-consuming testing procedures and protocols	Bernstein, Paez, Pennington, Rafii a, Sterne	Moderate/minor concerns: two of the five studies contributing to this theme were low quality but this is not expected to have a large impact on this recommendation	No or very minor concerns: these findings clearly addressed attitudes towards arranging the screening test	Moderate concerns: the need to fast, drink a glucose drink and wait were clear barriers to the OGTT and alternative tests were suggested, but no studies showed increased attendance using alternative tests	Minor concerns: the data provide a clear understanding of how OGTTs discourage attendance	Moderate confidence	OGTTs discourage screening; a shorter test without fasting or a glucose drink is desired and may increase uptake
Family-related practicalities								
8	Schedule postpartum glucose testing to coincide with other postpartum check-ups (both mothers' and children's appointments)	Links to inconvenience of appointments and motivation in general; specifically Bennett, Nielsen, Rafii a, Rafii b	No or very minor concerns: the studies that directly contributed to this recommendation were the highest quality	No or very minor concerns: these findings clearly addressed attitudes towards screening and arranging the test	Moderate concerns: participants attended appointments for other reasons (eg. for vaccinations or to discuss contraception) and Rafii b describes 'accidental screening', therefore we only assume that combined appointments are more convenient and worth attending	Major concerns: only a few studies contributed to this theme, plus general inconvenience of appointments and motivation to attend	Low confidence	Glucose tests were difficult to attend; it is assumed that combing them with appointments that women are more motivated to attend would facilitate attendance
Concern about diabetes								
9	Educate women about the purpose of screening and how the procedure works	Abraham, Bennett, Bernstein, Campbell, Kilgour, Lie, Nielsen, Paez, Rafii a, Rafii b, Sterne, Zulfiqar	Minor concerns: mostly high quality studies contributed to this recommendation	Minor concerns: these findings showed that apathy and fear of diagnosis acted as a barrier to screening and understanding the need for screening as a facilitator to screening attendance specifically	Minor concerns: findings show that knowledge about the purpose of screening increased attendance and so it is clear and logical that education of women on the purpose of screening should increase attendance	Minor concerns: several studies discuss the themes contributing to this recommendation in detail	High confidence	Often knowledge of the purpose of screening increased attendance; apathy and fear of diagnosis were barriers but could be reduced through education
10	Educate women that postpartum self-testing, behaviour compliance or one negative test result is not sufficient to rule out T2D in the long term	Bennett, Bernstein, Kilgour, Lie, Nielsen, Paez, Rafii a, Rafii b	Minor concerns: mostly high quality studies contributed to this recommendation	Minor concerns: these findings were relevant predominantly to postpartum screening, but did include other aspects of postpartum behaviour such as diet	Minor concerns: use of glucometer postpartum consistently discouraged screening attendance in these studies	Moderate concerns: four of the studies discuss the impact of self-testing on screening attendance whilst remaining have sparse findings addressing role of reassurance of postpartum readings and test results generally	Moderate confidence	Many studies explored how postpartum self-testing influenced concern about diabetes; education that this is not sufficient to rule out diabetes could increase screening attendance

Recommendations frequently result from findings within multiple themes but have been presented under the primary contributing theme. Only studies directly contributing to the recommendation have been cited

GDM: gestational diabetes; OGTT: oral glucose tolerance test; T2D: type 2 diabetes