Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Barriers and facilitators to implementing a digital perinatal mental health screening and referral pathway in primary care: a qualitative implementation study in Portugal

Teresa Reis

treis@ulsac.min-saude.pt

Unidade Local de Saúde do Alentejo Central

Rui Raimundo

University of Évora

Carla Santanita

University of Évora

Ana Rita Matias

University of Évora

Research Article

Keywords: Perinatal mental health, digital pathway, primary care, implementation science, screening, early intervention, COM-B model, qualitative research.

Posted Date: November 5th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10836586/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background:

Digital tools are increasingly promoted to improve the reach, timeliness and continuity of perinatal mental health screening and referral. However, less is known about how digitally integrated screening pathways are adopted by primary care professionals in routine practice. This study examined the implementation of the Matter digital perinatal mental health screening and referral pathway in primary care in Central Alentejo, Portugal, focusing on barriers and facilitators shaping use among healthcare workers.

Methods:

This qualitative implementation monitoring evaluation examined the Matter programme. A purposive maximum-variation sample of 14 primary care professionals (10 physicians and four nurses) from eight units was recruited from 29 eligible staff. Participants with at least one recorded digital pathway activation before recruitment were classified as users, whereas those with none were classified as non-users. Semi-structured telephone interviews were conducted in June and July 2025 by an external behavioural science monitoring team independent of programme delivery. Data were analysed in Portuguese using thematic analysis, combining coding informed by the Capability, Opportunity, Motivation-Behaviour model (COM-B) and the Theoretical Domains Framework with inductive theme development; the Behaviour Change Wheel informed implementation recommendations.

Results:

Participants in both groups recognised the clinical relevance of perinatal mental health screening and considered the Matter programme's digital pathway useful for earlier identification and referral. Positive perceptions did not, however, ensure routine use. Five themes were identified: time pressure and competing clinical demands; technical and workflow barriers; role clarity and team-based implementation; local champions and organisational support; and equity challenges related to language and communication. Adoption was shaped principally by physical and social opportunity, including staff availability, and by variable psychological capability. Facilitators included intuitive platform design, routines outside consultation time, nurse-physician collaboration, responsive support and evidence-informed recommendations.

Conclusions:

Uneven adoption of the Matter programme's digital pathway was not primarily explained by rejection of perinatal mental health screening, but by whether the pathway could be embedded in routine workflows

and team-based care. Sustainable implementation requires role clarity, protected time, reliable technical infrastructure, local support and equity-oriented adaptations.

Trial registration:

ClinicalTrials.gov NCT07659977.

BACKGROUND

Perinatal mental disorders are among the most common complications of pregnancy and the postpartum period, affecting approximately one in five women [1, 2]. Their consequences extend beyond maternal distress and functional impairment: perinatal mental disorders are associated with maternal morbidity and mortality, adverse obstetric outcomes, and effects on infant and child development, while also generating substantial costs for families, healthcare systems and society [1, 3]. Despite this burden, these conditions remain frequently undetected and undertreated.

Clinical guidelines broadly support screening for mental health conditions during pregnancy and the postpartum period, although recommendations vary across countries regarding timing, instruments, responsible professionals and the conditions required for implementation [4–6]. Screening should therefore not be understood as a stand-alone clinical task. Its value depends on its integration within systems capable of providing further assessment, referral, treatment and follow-up when needs are identified [4, 7]. Evidence suggests that screening programmes can improve the identification of perinatal mental health conditions and may contribute to reductions in depressive and anxiety symptoms when linked to appropriate care pathways [7, 8].

However, the availability and organisation of perinatal mental healthcare remain highly uneven. A scoping review of the World Health Organization European Region found that only 10 of 53 countries had established perinatal mental health screening programmes, 11 had specific treatment services and 23 had official guidelines, demonstrating substantial variation in screening, referral and treatment provision across Europe [9]. In Portugal, studies have identified clinically relevant levels of depressive symptoms during pregnancy and the postpartum period [10, 11]. Undertreatment also remains a concern: in a comparative study conducted in Portugal and Norway, 79.8% of Portuguese women with active symptoms of perinatal depression were not receiving treatment [12]. Regional evidence from Baixo Alentejo similarly found that 27.57% of 301 postpartum women scored above the risk threshold on the Edinburgh Postnatal Depression Scale [13]. Together, these findings support the need for systematic pathways that connect early identification with timely clinical action.

Digital technologies may facilitate this process by extending the reach and continuity of screening, automating patient contact and supporting communication between screening and referral processes. Systematic-review evidence indicates that digital perinatal mental health screening is generally feasible and acceptable [14]. Nevertheless, evidence regarding sustained adoption in routine care and long-term

clinical impact remains less developed. Much of the existing literature has focused on feasibility, acceptability, tool development or implementation planning rather than on the normalisation of digitally integrated screening-and-referral pathways in everyday clinical workflows [14, 15]. Studies of digital or digitally supported perinatal screening systems have also shown that implementation depends on service context, professional engagement and the capacity to connect screening results with effective care pathways [16–19].

More broadly, implementation research indicates that the adoption of perinatal mental healthcare practices is shaped by interacting determinants at the individual, interpersonal, organisational and health-system levels. Recurrent barriers include limited professional knowledge or confidence, time pressure, unclear responsibilities, insufficient training, competing clinical demands and inadequate referral capacity, whereas leadership, multidisciplinary collaboration, locally adapted workflows and organisational support can facilitate implementation [20, 21]. Similar determinants have been identified in the implementation of digital mental health technologies, where usability alone is insufficient to ensure adoption if a tool does not align with existing work processes and organisational conditions [22, 23]. Language, literacy, cultural appropriateness and digital access also influence participation and may generate or reinforce inequities if they are not incorporated into programme design and implementation [17, 24].

Against this background, the Matter programme developed a digitally integrated pathway to support perinatal mental health screening, risk identification and referral in primary care. Implemented at the Local Health Unit of Central Alentejo, Portugal, the pathway was integrated into the information and communication technology environment used by participating healthcare units. Physicians and nurses could activate the pathway for pregnant and postpartum women, after which the system initiated a sequence of screening assessments and generated alerts when professional review or further action was required. The programme piloted screening from pregnancy to the first year postpartum, with the aim of connecting systematic assessment with timely follow-up and referral when indicated.

Although healthcare professionals generally perceived the Matter pathway as clinically relevant, its uptake was uneven across primary care units and remained below the expected level. Existing research has described broad barriers and facilitators to perinatal mental health screening and has examined several digitally supported screening interventions. However, evidence remains limited on how an ICT-embedded screening-and-referral pathway becomes—or fails to become—integrated into routine primary care practice in a Southern European health system where universal perinatal mental health screening is not yet fully institutionalised. Examining both professionals who adopted the pathway and those who did not offers an opportunity to identify the behavioural, workflow-related and organisational conditions underlying variation in uptake. Accordingly, this study aimed to explore barriers and facilitators to the implementation of the Matter digital perinatal mental health screening and referral pathway among primary healthcare professionals, with particular attention to differences between users and non-users.

METHODS

Study design and setting

This study reports a qualitative implementation monitoring evaluation embedded within the Matter programme, a multicomponent intervention designed to support perinatal mental health screening, risk stratification, early intervention and referral in primary healthcare services in Central Alentejo, Portugal. The evaluation examined how healthcare workers adopted the programme's digital pathway in routine practice and sought to identify implementation barriers and facilitators relevant to future replication and scale-up. It did not assess clinical effectiveness. The evaluation focused on implementation outcomes; clinical effectiveness will be explored elsewhere.

The Matter digital pathway was integrated into the routine ICT environment used in most national primary care units. Healthcare workers could activate a patient pathway from the daily consultation list through a single right-click. The system then initiated the patient journey, sent sociodemographic, clinical characterization and screening questionnaires, displayed pathway status and generated alerts or recommendations requiring professional follow-up. Activation was encouraged during routine pregnancy and postpartum surveillance contacts, although local teams could organise pathway activation and review during or outside consultations.

The sociodemographic and clinical questionnaire was developed specifically for this study and has not been published elsewhere. It collected information on sociodemographic characteristics, pregnancy and postpartum-related variables, obstetric history, previous mental health problems, smoking status, and formal postpartum support. The English-language version of this original questionnaire is provided as Supplementary File 2. Screening of mental health symptoms were assessed separately using the Edinburgh Postnatal Depression Scale (EPDS), a previously published and validated instrument [25].

Implementation monitoring was undertaken by an external behavioural science team independent of programme delivery. The target behaviour was defined as healthcare workers initiating and following the Matter digital pathway during or around maternal healthcare contacts. COM-B guided the higher-level specification of capability, opportunity and motivation barriers and facilitators [26]. The Theoretical Domains Framework informed the interview guides and initial coding framework [27, 28], and the Behaviour Change Wheel supported interpretation and the formulation of implementation recommendations [26, 29].

A semi-structured interview guide was developed specifically for this study and was not previously published. It was designed to explore healthcare professionals’ experiences of the Matter referral process and digital platform, including perceived usefulness, ease of use, facilitating conditions, social influences, attitudes towards the platform, behavioural intention, and changes in use over time. The English-language version of the interview guide is provided as Supplementary File 1.

Data collection

A purposive sampling strategy sought maximum variation by including physicians and nurses, healthcare workers with different levels of platform use, and professionals from multiple primary care units. Eligible participants were healthcare workers from participating units visited during implementation for whom a telephone number was available to the monitoring team. Sampling status was determined from programme records: users had initiated at least one Matter digital pathway before recruitment, whereas non-users had no recorded pathway activation. These labels described platform behaviour and did not imply support for or opposition to the programme.

Twenty-nine eligible healthcare workers were contacted by telephone or message after prior notification from the Matter programme coordinator. Participants who did not respond were contacted at least three times. Fourteen participated, one scheduled an interview but did not subsequently respond, eight declined and six did not respond, yielding a response rate of 48.3%. Interviews were conducted in June and July 2025, lasted approximately 15 minutes, and were undertaken by members of the external behavioural science monitoring team with no role in programme delivery and no supervisory relationship with participants. Two semi-structured interview guides were used: one for users and an adapted version for non-users. The interview guides were developed from relevant literature and the COM-B and Theoretical Domains Framework.

The final sample comprised 13 women and one man, with a mean age of 44 years. It included 10 physicians and four nurses from eight primary care units; eight participants had initiated at least one pathway and six had no recorded pathway activation. These categories did not distinguish one-time activation from sustained use. Platform use was unevenly distributed across units. Because recruitment was limited by response and the non-user subgroup was small, thematic saturation was not claimed, particularly for barriers reported by non-users (Table 1).

Table 1
Participant characteristics and recruitment

Total interviewed	**14**
Eligible participants contacted	29
Response rate	48.3%
Mean age	44 years
Gender	13 women; 1 man
Profession	10 physicians; 4 nurses
Units represented	USF Eborae (1), USF Planície (2), USF Foral (4), USF Matriz (3), USF Lusitânia (1), USF Salus (1), USF Alcaides (1), UCC Montemor (1)
Platform-use status	8 users; 6 non-users

Data analysis

Interview material was transcribed verbatim and analysed in Portuguese, the language in which the interviews were conducted; illustrative quotations were translated into English for publication. Data were analysed using thematic analysis [30] through a hybrid deductive-inductive approach. An initial coding framework was developed from COM-B, the Theoretical Domains Framework and the interview guides, and was iteratively refined through close reading of the transcripts. Qualitative data were managed in Dovetail.

Inductive patterns across users and non-users were developed into final themes and subsequently mapped to COM-B domains. Code frequencies used in the internal monitoring report were treated as descriptive aids rather than statistical measures of thematic importance.

The monitoring coding tree comprised seven areas—context, position, platform use, technology, decision-making, learning and interactions— with subcodes addressing consultation dynamics, perceived relevance, usability, digital resources and skills, referral decision-making, support, facilitators and barriers (Supplementary Table S1). For this manuscript, these codes were synthesised into five interpretive themes presented in the Results and mapped to COM-B domains and selected Theoretical Domains Framework constructs in Table 2. Reporting was guided by the Consolidated Criteria for Reporting Qualitative Research (COREQ) [31].

Table 2 COM-B barriers and facilitators

COM-B	BARRIER/ FACILITATOR	EXAMPLE	USER vs. NON-USER
CAPABILITY: PSYCHOLOGICAL CAPABILITY	Theme 2 - Technical and workflow barriers: Uncertainty about postpartum inclusion and later pathway stages	“The only difficulty I found was in women who already had the babies, that was not so intuitive for me.” (P02, physician, user)	Seemingly more evident in less routine cases, especially postpartum women.
CAPABILITY: PSYCHOLOGICAL CAPABILITY	Theme 2 - Technical and workflow barriers: Difficulty understanding platform procedures when errors occurred	“I did not understand. Then I even contacted the assistant of the platform, but I could not understand anything. We just turned it off and on again and then it worked, but we did not understand what was going on.” (P03, physician, user)	Reported by users who attempted to use the platform but faced unclear technical or procedural problems.
CAPABILITY: PSYCHOLOGICAL CAPABILITY	Theme 2 - Technical and workflow barriers: Platform navigation generally perceived as easy and intuitive	“The platform is easy (...). this one is very intuitive, very easy, so honestly, I do not understand the resistance.” (P05, physician, user)	Mainly reported by users, but also acknowledged by some non-users.
OPPORTUNITY: PHYSICAL OPPORTUNITY	Theme 1 - Time pressure and competing clinical demands: Time pressure and multitasking during consultations	“It is easy [the pathway activation], it is really just forgetting in the middle of the appointment.” (P04, physician, user)	Reported across users and non-users. Even motivated professionals could forget pathway activation during busy consultations.
OPPORTUNITY: PHYSICAL OPPORTUNITY	Theme 1 - Time pressure and competing clinical demands: Consultation logistics and competing clinical demands	“During the appointment I am so busy with so many things…it is not lack of time [in general], it is the consultation logistics.” (P02, physician, user)	Reported across the sample, especially by professionals working in short, dense maternal health consultations.
OPPORTUNITY: PHYSICAL OPPORTUNITY	Theme 1 - Time pressure and competing clinical demands: ICT overload and digital saturation in primary care	“I work with a lot of platforms in primary care, and what tires us is having this number of platforms to deal with. But this one is very intuitive…” (P05, physician, user)	Reported by users and non-users; more problematic when Matter was perceived as another platform in an already saturated ICT environment as opposed to an easy pathway

OPPORTUNITY: PHYSICAL OPPORTUNITY	Theme 2 - Technical and workflow barriers: Technical errors preventing pathway activation	“I tried to start the journey [pathway] (...) I introduced the data (...) and then in the end it always ended in error.” (P07, nurse, non-user)	More consequential for users and potential users with negative first experiences.
OPPORTUNITY: PHYSICAL OPPORTUNITY	Theme 5 - Equity challenges: Incorrect or incomplete patient contact data	“She referred a patient and thought that, since she had no answer (...), she was not interested.” (P06, physician, user)	Relevant across users and non-users; particularly affected professionals interpreting patient non-response.
OPPORTUNITY: SOCIAL OPPORTUNITY	Theme 5 - Equity challenges: Language, literacy and cross-cultural communication barriers	“She was from Guinea-Bissau, she did not know how to speak Portuguese and did not go to school. She only spoke creole, but it was a kind of Guinea-Bissau Creole that I am not used to. So, it was very hard.” (P01, physician, user)	Reported in relation to migrant or linguistically diverse patients.
OPPORTUNITY: SOCIAL OPPORTUNITY	Theme 3 - Role clarity and team-based implementation: Role ambiguity between physicians and nurses	“I thought it would be interesting to have the nurse also there, so I lost some motivation then (...). Because I was very motivated and in the end, I could not do anything.” (P07, nurse, non-user)	More evident in units where professional responsibilities for activation, referral and follow-up were not clearly defined.
OPPORTUNITY: SOCIAL OPPORTUNITY	Theme 3 - Role clarity and team-based implementation: Nurse–physician collaboration and shared monitoring	“If I forget (...) I have the nurse, the family nurse (...) by my side (...). We have an extra pair of eyes focused on this objective.” (P05, physician, user)	Stronger in high-use units and among teams with shared responsibility.
OPPORTUNITY: SOCIAL OPPORTUNITY	Theme 3 - Role clarity and team-based implementation: Unit-level collective engagement	“We all use [it] (...) my unit is the one that has pretty much 100% of pregnant women referred. (...) Nurses also know how to use the platform.” (P05, physician, user)	Stronger in units with collective routines and shared knowledge of the platform.
OPPORTUNITY: PHYSICAL AND	Theme 2 - Technical and workflow barriers: Use outside consultation time	“When I know I missed a pregnant woman (...) I open my agenda in that afternoon (...) and make the referrals I	Reported by users who developed compensatory routines.

SOCIAL OPPORTUNITY		missed." (P02, physician, user)	
PHYSICAL OPPORTUNITY; TDF: BEHAVIOURAL REGULATION	Theme 2 - Technical and workflow barriers: Reminder systems and structured routines	"I already have a system in place to guarantee I do not forget to refer. I make monthly appointments, so even if I forget one month, in the next one it is introduced." (P06, physician, user)	More common among consistent users.
OPPORTUNITY: SOCIAL OPPORTUNITY	Theme 4 - Local champions and organisational support: Helpdesk and project team support	"I use the UpHill helpdesk a lot. If I have any doubt, they reply really quick and always solve the problems." (P05, physician, user)	Valued by users, especially when doubts or technical problems emerged.
OPPORTUNITY: SOCIAL OPPORTUNITY	Theme 4 - Local champions and organisational support: Local champions and proximity support	"I am also lucky because I have a colleague of the project team in my unit. So, in case I have any troubles, she continues to ask to help me." (P03, physician, user)	Stronger in units with colleagues directly involved in the Matter project.
MOTIVATION: REFLECTIVE MOTIVATION	Cross-cutting finding - High reflective motivation: Perceived clinical relevance of perinatal mental health screening	"This project has value, I really think it is very important!" (P07, nurse, non-user)	High across users and non-users.
MOTIVATION: REFLECTIVE MOTIVATION / EMOTION	Cross-cutting finding - High reflective motivation: Empathy and awareness of perinatal vulnerability	"Maybe the fact that I am a woman (...) makes me more aware of the importance of this [kind of screening] during pregnancy and postpartum." (P03, physician, user)	Particularly visible among participants who linked the intervention to personal or professional sensitivity to pregnancy-related vulnerability.
MOTIVATION: REFLECTIVE MOTIVATION	Cross-cutting finding - Motivation and perceived redundancy: Perceived redundancy when clinicians felt they already knew the patient	"Before the baby is born we already know patients (...). For us, or for me, it was not necessary. (...). And I think it is yet another step, another scale." (P08, physician, non-user)	A non-user.
MOTIVATION: REFLECTIVE	Perceived improvement in quality of care	"I am a better doctor, I care better for these women in part, in great part, because of	Reported by engaged users.

MOTIVATION		Matter." (P02, physician, user)	
MOTIVATION: REFLECTIVE MOTIVATION	Confidence in evidence-informed recommendations	"It is comforting, safe, to know I am doing something supported by the most recent evidence and safely." (P05, physician, user)	Reported by users who valued embedded clinical recommendations.
MOTIVATION: REFLECTIVE MOTIVATION	Earlier identification of alarm signs and referral needs	"I always refer, for prevention, if there is any alarm sign, that sometimes happens mid-pregnancy, it can be caught immediately." (P03, physician, user)	Reported by users who perceived the pathway as clinically useful.

An LLM was used to support English revision and formatting. All revisions were subsequently reviewed and adapted using Microsoft Word's Track Changes function.

Ethics and consent

The study involved primary healthcare physicians and nurses at ULSAC. Data collection began only after the required institutional, ethics and data-protection authorisations had been obtained. The Matter programme was approved by the Ethics Committee of the Regional Health Administration of Alentejo on 29 December 2023 (process 27/CE/2023; opinion 20/CE/2023; Information 50/INFCE/2023). The University of Évora Data Protection Officer reviewed the project, and approval from the ULSAC Data Protection Officer was obtained. All procedures complied with the Declaration of Helsinki and the General Data Protection Regulation.

Before each interview, participants received information about the study objectives and procedures, guarantees of anonymity and confidentiality, and their right to withdraw. Free, explicit and informed consent was audio-recorded. Identifying information and the main research database were stored separately, with access restricted to authorised research-team members. Results were reported in aggregate, and cross-tabulations that could increase the risk of identifying participants were avoided.

No directly identifying information is presented in this article. Primary care units are described in aggregate to reduce deductive identification risk in the small regional professional community.

Researchers conducting the interviews were external to implementation of the Matter programme and had no supervisory relationship with participants.

RESULTS

The analysis generated five themes: (1) time pressure and competing clinical demands; (2) technical and workflow barriers; (3) role clarity and team-based implementation; (4) local champions and organisational support; and (5) equity challenges related to language and communication. Across both users and non-users, reflective motivation was generally high: participants considered perinatal mental health clinically important and viewed systematic screening as a valuable addition to care. Differences in adoption were therefore associated mainly with opportunity and capability rather than with rejection of the programme (see table 3, annexed).

Table 3. Comparison between users and non-users

AREA	USERS	NON-USERS
Perceived relevance	Generally high	Generally high, but sometimes seen as redundant
Workflow integration	Developed compensatory routines	Activation competed with consultation demands
Team support	More frequent in high-use units	Less role clarity and weaker team routines
Technical experiences	Could overcome problems via helpdesk and champions	Negative first experiences discouraged use
Patient barriers	Recognised but managed case-by-case	More likely to interpret non-response as lack of interest

Time pressure and competing clinical demands

Consultation logistics were the most consistently described constraint. Participants characterised maternal health appointments as short, dense and multitasking encounters, with clinical, administrative and relational demands competing for attention. Even professionals who considered pathway activation technically simple described forgetting it during appointments. The main constraint was therefore the availability of attention at the points when the pathway had to be activated and later reviewed.

R: It is easy; it is really just forgetting in the middle of the appointment. (P04, physician, user)

R: Out of the appointment context, that was what I was saying, during the appointment I am so busy with so many things…it is not lack of time [in general], it is the consultation logistics, it is very difficult, with new

appointments every 15 minutes or 20 minutes to fulfil our own expectations, but also the patient's expectations. (P02, physician, user)

Participants also described extensive computer use during consultations as disruptive to communication with patients. The Matter pathway was seen as competing with other clinical tasks and with the need to prioritise conversation and emerging patient needs over additional screen-based activity.

Technical and workflow barriers

Most participants described the Matter interface as intuitive, but technical and usability problems became more consequential under time constraints. Reported difficulties included system slowness, browser or connectivity problems, errors during pathway activation, uncertainty about including women whose pregnancy-stage steps were incomplete, and limited familiarity with postpartum stages, pathway status and alert follow-up. Although pathway activation and the interface were generally considered simple, these frictions disrupted routine use.

R: Because it is easy, the platform is easy (...). I work with a lot of platforms in primary care, and what tires us is having this number of platforms to deal with. But this one is very intuitive, very easy, so honestly, I do not understand the resistance. (P05, physician, user)

R: I tried, I tried to start the journey [pathway]. And (...) then I passed it on to the GP, because I introduced the data, all the data, the name tag, and then in the end it always ended in error. (P07, nurse, non-user)

Users who embedded the pathway successfully often created verification and organisation routines outside consultations. They reviewed appointment lists, activated missed pathways later in the day, checked pending questionnaires and used monthly reminders. These routines contributed to embedding pathway activation and patient journey monitoring as scheduled elements of work.

R: So, when I know I missed a pregnant woman, when I notice that, what I do is open my agenda in that afternoon and open one by one of all patients' references in the UpHill [Matter] platform and make the referrals I missed, or analyse the cases of pregnant women I missed. (P02, physician, user)

R: I already have a system in place to guarantee I do not forget to refer. I make monthly appointments, so even if I forget one month, in the next one it is introduced. (P06, physician, user)

Role clarity and team-based implementation

The distribution of responsibility between physicians and nurses varied across units. Some participants were uncertain about who could activate or follow the pathway, while others assumed that a colleague was already performing the task. In these settings, individual motivation was affected by role ambiguity

and perceived redundancy. Conversely, units with shared responsibilities, routine communication and joint management of platform activity reported fewer missed cases and more consistent follow-up.

R: I thought it would be interesting to have the nurse also there, so I lost some motivation then (...). Because I was very motivated and in the end, I could not do anything. (P07, nurse, non-user)

R: If I forget... I have the family nurse by my side... We have an extra pair of eyes focused on this objective. (P05, physician, user)

Team-based implementation was particularly helpful because it distributed screening-related work across colleagues, who could support one another, verify pathway status and identify and communicate cases requiring attention.

Local champions and organisational support

Responsive support from the Matter team and the UpHill helpdesk enabled participants to resolve technical or procedural uncertainty. Proximity to colleagues involved in the Matter programme was especially valuable because support was embedded in everyday workplace relationships. Local champions functioned as communication channels, practical troubleshooters and translators of programme requirements into unit-specific routines.

R: I use the UpHill helpdesk a lot. If I have any doubt, they reply really quickly and always solve the problems. (P05, physician, user)

R: I am also lucky because I have a colleague of the project [Matter programme] team in my unit… (P03, physician, user)

Participants also valued the pathway's clinical contribution. They reported that it increased attention to mental health, supported earlier identification and referral, and provided evidence-informed recommendations that were reassuring in clinical decision-making. These perceived benefits reinforced motivation but were most likely to translate into use when organisational support was accessible and close to the point of care.

R: It is comforting, safe, to know I am doing something supported by the most recent evidence. (P05, physician, user)

Equity challenges related to language and communication

Besides clinical and relational needs, the digital pathway depended on accurate patient contact information and on patients being able to receive, understand and complete questionnaires. Missing or incorrect telephone numbers and email addresses were often identified as reasons for interruptions in screening and sometimes led professionals to interpret non-response as lack of interest. Language and literacy barriers were particularly important for migrant women who did not speak or read Portuguese fluently, limiting informed explanation, questionnaire completion and follow-up.

R: I think she was from Guinea, Guinea-Bissau, she did not know how to speak Portuguese and did not go to school. She only spoke creole, but it was a kind of Guinea-Bissau creole that I am not used to. So, it was very hard…but then she went to Coimbra. (P01, physician, user)

These barriers reflected the interaction between digital design, patient communication and the resources available in each unit.

Comparison between users and non-users

Both users and non-users generally recognised the relevance of perinatal mental health screening. Users were more likely to have developed practical routines, to work in teams with shared responsibilities, and to have access to responsive support or local champions. Non-use was more often associated with saturated workflows, uncertainty about roles, negative first technical experiences, perceived redundancy, or the assumption that another professional was responsible.

DISCUSSION

This study examined the implementation of a digital perinatal mental health screening and referral pathway in primary care in Central Alentejo, Portugal, with a specific focus on barriers and facilitators shaping healthcare workers' use of the platform. The findings showed uneven uptake of the pathway, shaped by five major issues: time pressure and competing clinical demands; technical and workflow barriers; role clarity and team-based implementation; local champions and organisational support; and equity challenges related to language and communication. This uneven uptake was not primarily explained by rejection of the intervention or by doubts about the importance of perinatal mental health screening.

Participants generally recognised the clinical relevance of systematic screening, valued the possibility of earlier identification of psychological distress, and perceived the pathway as improving care. However, this positive perception did not automatically translate into routine use. Adoption depended on the interaction between individual capability, organisational opportunity and professional motivation, as conceptualised in the COM-B model and the Behaviour Change Wheel [26, 29]. These findings correspond to existing literature on the implementation of perinatal mental health screening, which shows that screening is generally considered important but that barriers to implementation exist at individual, professional, interpersonal, organisational, political and societal levels [20, 21]. Matter adds to this literature by showing that uneven uptake across ULSAC units was primarily explained not by rejection but by limited opportunities and variable capabilities: limited consultation time, multitasking during appointments, technical friction within already demanding ICT systems, and unclear distribution of referral-related tasks.

The central behaviour targeted by the Matter intervention was the activation and follow-up of a digital screening pathway by healthcare workers during or around maternal healthcare contacts. According to the COM-B approach, the strongest facilitator identified was reflective motivation. Most participants

considered perinatal mental health screening clinically necessary and ethically aligned with good maternal care. This is consistent with international evidence showing that professionals often recognise the importance of perinatal mental healthcare while struggling to implement screening, referral and treatment pathways consistently in routine services [20, 21, 32]. This suggests that the implementation challenge concerned normalising pathway activation within healthcare workers' everyday practice [33].

Capability-related barriers were evident in variable confidence in platform use and in uncertainty about later steps of the pathway. Although the system was generally described as easy and intuitive, participants still reported difficulties with specific patient situations, especially postpartum inclusion, monitoring pathway status, and interpreting or acting on some technical processes. Opportunity-related barriers were the most consequential. Participants repeatedly described consultations as time-constrained, cognitively demanding, and already saturated with clinical, administrative and relational tasks. Even when initiating the Matter pathway involved a technically simple action, it competed with multiple demands during short appointments. Several participants described forgetting to activate the pathway because consultation dynamics made it difficult to integrate additional digital tasks. These findings are consistent with multi-level models of implementation, which identify organisational and system-level constraints, such as time pressure, workflow fragmentation and resource limitations, as central barriers to the uptake of perinatal mental health screening [20, 21]. This finding also aligns with evidence from digital health implementation studies showing that integration into clinical work processes is often more decisive than platform use alone [23, 34, 35]. It further supports the World Health Organization's framing of perinatal mental health integration as a service-design issue [32].

The fact that Matter uptake was stronger where teams adapted work around the pathway, rather than relying exclusively on individual professionals to remember activation during consultations, supports this interpretation. Examples of these strategies included reviewing appointment lists outside consultation time, allocating specific time for pathway activation, involving nurses as additional monitors and activators, and developing team-based routines to identify missed cases. These adaptations made the use of the pathway a collective process. In line with existing literature, these findings highlight the importance of organisational and social facilitators, including teamwork, local leadership and clearly defined roles, in enabling the integration of screening practices into routine care [20, 21]. According to the Behaviour Change Wheel, this indicates the relevance of enablement, environmental restructuring and modelling, supported by service provision and local guidelines as policy categories [26, 29].

In this sense, the study highlights the importance of social opportunity. Uptake was facilitated by team involvement, peer support and local champions. Champions were key project interlocutors who often translated the intervention into local working practices and helped colleagues incorporate screening into existing care routines. This extends existing literature on implementation champions in healthcare technology by showing that their value lies both in advocacy and in making the intervention usable within the constraints of specific units [36].

Although nurses entered the programme later than physicians, they contributed substantially to the number of screenings. In some units, collaboration between physicians and nurses reduced missed opportunities, improved monitoring and supported follow-up, particularly when roles in the screening and pathway activation process were clearly defined. This is consistent with implementation literature emphasising the importance of role clarity, local coordination and team-based workflows in promoting new healthcare practices [20, 23, 36].

Technical and infrastructural barriers also shaped adoption, as did incorrect contact information for patients, which reduced the ability to send automated questionnaires and therefore compromised completion of the screening process. Language was also identified as a barrier, particularly for women who did not speak Portuguese fluently or had limited Portuguese literacy. This aligns with previous evidence showing that patient-level factors, including language barriers, cultural differences and limited health literacy, can significantly reduce engagement with screening interventions and contribute to inequities in access to care [17, 24]. These findings show how universal screening can reproduce inequities if it assumes that all patients can access, understand and complete digital questionnaires in the same way. According to the Behaviour Change Wheel, these limitations point to the need for environmental restructuring, enablement and service provision adaptations to increase both patient and professional engagement with the intervention [26, 29].

Strengths and limitations

A strength of this study was the inclusion of both users and non-users, physicians and nurses, and professionals from eight primary care units, together with analysis by an external monitoring team. The study also has limitations. The sample was small, purposively recruited and self-selected; interviews were brief and conducted by telephone; and thematic saturation was not reached for non-users. Findings reflect one Portuguese region and primarily healthcare worker perspectives; they do not capture patients' experiences or direct observation of unit workflows, indicating a need for further research in these areas.

Implications for practice

The findings suggest that improving the implementation of digital perinatal mental health screening requires moving beyond a focus on platform usability towards a stronger alignment with clinical workflows and team-based practices. In practice, this means embedding screening and referral tasks within routine care processes. Structured routines, such as periodic review of patient lists, dedicated moments for pathway activation, and shared responsibilities between physicians and nurses, appear to enhance consistency of use. These strategies are consistent with multi-level approaches to implementation, which emphasise the interaction between individual behaviour and organisational context [20, 21]. Before replication or scale-up, implementation teams should assess platform stability, ICT infrastructure, staffing arrangements and local workflows. Each unit should identify a coordinator or champion, define essential and optional tasks, and agree who will activate pathways, review alerts and follow up incomplete questionnaires. Protected or scheduled review periods, patient-list checks and

prompts can reduce reliance on memory during consultations. These strategies are consistent with environmental restructuring, enablement and tailored implementation support [26, 37, 38].

Addressing patient-related barriers is equally important. Ensuring accurate contact data, providing culturally and linguistically appropriate communication, and considering alternative modes of engagement for populations with lower literacy or limited digital access are essential to avoid exacerbating existing inequities in access to care.

Implications for policy

From a policy perspective, the findings reinforce the need to conceptualise perinatal mental health screening as a system-level intervention that goes beyond the clinical task. Policies promoting universal screening should be accompanied by organisational and infrastructural support, including integration with existing electronic health record systems, allocation of protected time for screening-related activities, and clear definition of professional roles and responsibilities. These findings align with multi-level implementation frameworks that highlight the importance of system-wide alignment between policy, organisational structures and frontline practices [20, 21].

The Behaviour Change Wheel framework suggests that effective implementation requires coordinated policy actions across multiple domains, including service provision, guidelines and workforce development [26, 29]. In this context, investment in digital infrastructure should be matched by efforts to ensure interoperability, reduce technical friction, and support frontline professionals in integrating new tools into their routines.

Moreover, policies should explicitly address equity considerations in digital health interventions. Language accessibility, digital literacy and inclusion of vulnerable populations must be incorporated into the design and scaling of screening programmes to ensure that universal approaches do not inadvertently widen disparities in care.

CONCLUSION

The Matter digital perinatal mental health screening and referral pathway was perceived by healthcare workers as relevant, useful and aligned with the needs of pregnant and postpartum women in primary care. However, implementation across ULSAC units was uneven, demonstrating that acceptability alone is insufficient to ensure consistent adoption in routine practice. Uptake depended on the extent to which the intervention could be integrated into existing workflows and supported by organisational conditions. These findings reinforce that effective implementation requires embedding screening within team-based routines, supported by clear professional roles, repeated practical training, local champions, reminder systems, protected time for pathway review and reliable technical infrastructure.

Beyond workflow integration, particular attention should be given to specific operational and equity-related challenges, including postpartum inclusion, systematic follow-up of alerts, accuracy of patient contact data, and culturally and linguistically appropriate access for migrant populations and people with

low literacy levels. Addressing these factors is essential to ensure both effectiveness and equity in the delivery of perinatal mental health care.

These conclusions should be interpreted in light of the limitations identified in the discussion, and the results should not be interpreted as definitive estimates of programme effectiveness. Future research should build on these findings by incorporating larger and more diverse samples, triangulating qualitative insights with quantitative data, and including patient perspectives to better understand engagement and accessibility. This study contributes evidence that digital screening interventions in perinatal mental health may be perceived as clinically useful, but that their implementation and sustainable adoption require coordination with clinical workflows, organisational structures and the broader conditions shaping healthcare practice. Although context-specific, the finding that adoption depended on distributed team routines rather than individual acceptability offers a transferable implementation insight for digital screening pathways in other primary care systems.

Abbreviations

COM-B
Capability, Opportunity, Motivation–Behaviour model
COREQ
Consolidated Criteria for Reporting Qualitative Research
DPO / DPOs
Data Protection Officer / Data Protection Officers
EPDS
Edinburgh Postnatal Depression Scale
GDPR
General Data Protection Regulation
GP
General Practitioner
ICT
Information and Communication Technology
ULSAC
Local Health Unit of Central Alentejo
WHO
World Health Organization
ARS Alentejo
Regional Health Administration of Alentejo / Administração Regional

Declarations

Ethics approval and consent to participate

The Matter programme was approved by the Ethics Committee of the Regional Health Administration of Alentejo on 29 December 2023 (process 27/CE/2023; opinion 20/CE/2023; Information 50/INFCE/2023). The University of Évora Data Protection Officer reviewed the project on 21 December 2023, and approval from the ULSAC Data Protection Officer was obtained in October 2024. All participants provided free, explicit and audio-recorded informed consent before interview participation.

Consent for publication

No directly identifying information is presented in this article.

Availability of data and materials

The qualitative data are not publicly available because the small regional sample and contextual detail create a risk of deductive identification. Access to de-identified material is subject to applicable ethics, institutional and data-protection approvals and may be requested from the corresponding author.

Competing interests

The authors declare that they have no competing interests.

Funding

This work is part of the Matter Project, funded by the Calouste Gulbenkian Foundation.

Acknowledgements

The authors would like to express their sincere gratitude to the coordinators of the primary healthcare units and to all primary healthcare professionals who participated in the interviews. Their time, openness, and valuable insights were essential to the collection of the data that informed this study.

Author Contribution

TR and ARM: Conceptualization; Methodology; Writing – original draft; Writing – review and editing.TR, CS, ARM and RR: Conceptualization; Methodology; Validation; Data curation; Writing – review and editing.All authors critically reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

References

1. Howard LM, Khalifeh H. Perinatal mental health: a review of progress and challenges. World Psychiatry. 2020;19(3):313–27. 10.1002/wps.20769.
2. Al-Abri K, Edge D, Armitage CJ. Prevalence and correlates of perinatal depression. Soc Psychiatry Psychiatr Epidemiol. 2023;58(11):1581–90. 10.1007/s00127-022-02386-9.

3. Layton E, Roddy Mitchell A, Kennedy EC, Moran AC, Palestra F, Chowdhary N, et al. Maternal mental health matters: indicators for perinatal mental health—a scoping review. PLoS ONE. 2025;20(1):e0317998. 10.1371/journal.pone.0317998.
4. El-Den S, Pham L, Anderson I, Yang S, Moles RJ, O'Reilly CL, et al. Perinatal depression screening: a systematic review of recommendations from member countries of the Organisation for Economic Co-operation and Development (OECD). Arch Womens Ment Health. 2022;25(5):871–93. 10.1007/s00737-022-01249-1.
5. O'Brien J, Gregg L, Wittkowski A. A systematic review of clinical psychological guidance for perinatal mental health. BMC Psychiatry. 2023;23:790. 10.1186/s12888-023-05173-1.
6. Radoš SN, Ganho-Ávila A, Rodríguez-Muñoz MF, Bina R, Kittel-Schneider S, Lambregtse-Van den Berg MP, et al. Evidence-based clinical practice guidelines for prevention, screening and treatment of peripartum depression. Br J Psychiatry. 2025;227(5):798–809. 10.1192/bjp.2025.43.
7. Waqas A, Koukab A, Meraj H, Dua T, Chowdhary N, Fatima B, et al. Screening programs for common maternal mental health disorders among perinatal women: report of the systematic review of evidence. BMC Psychiatry. 2022;22:54. 10.1186/s12888-022-03694-9.
8. Reilly N, Kingston D, Loxton D, Talcevska K, Austin MP. A narrative review of studies addressing the clinical effectiveness of perinatal depression screening programs. Women Birth. 2020;33(1):51–9. 10.1016/j.wombi.2019.03.004.
9. Horáková A, Němcová H, Hrdličková K, Kalli S, Davletova A, Duarte MFRS, et al. State of perinatal mental health care in the WHO region of Europe: a scoping review. Front Psychiatry. 2024;15:1350036. 10.3389/fpsyt.2024.1350036.
10. Figueiredo B, Pacheco A, Costa RA. Depression during pregnancy and the postpartum period in adolescent and adult Portuguese mothers. Arch Womens Ment Health. 2007;10(3):103–9. 10.1007/s00737-007-0178-8.
11. Maia BR, Marques M, Bos S, Pereira AT, Soares MJ, Valente J, et al. Epidemiology of perinatal depression in Portugal: categorical and dimensional approach. Acta Med Port. 2011;24(Suppl 2):443–8. 10.20344/amp.1450.
12. Fonseca A, Branquinho M, Monteiro F, Araújo-Pedrosa A, Bjørndal LD, Lupattelli A. Treatment options and their uptake among women with symptoms of perinatal depression: exploratory study in Norway and Portugal. BJPsych Open. 2023;9(3):e77. 10.1192/bjo.2023.56.
13. Silva S, Barros M, Zangão O, Carvalho Ú, Sim-Sim M. Prevalence and contributing factors of postpartum depression risk during the pandemic among women living in Baixo Alentejo at Portugal. Sci Rep. 2025;15:35420. 10.1038/s41598-025-17949-4.
14. Clarke JR, Gibson M, Savaglio M, Navani R, Mousa M, Boyle JA. Digital screening for mental health in pregnancy and postpartum: a systematic review. Arch Womens Ment Health. 2024;27(4):489–526. 10.1007/s00737-024-01427-3.
15. Hussain-Shamsy N, Shah A, Vigod SN, Zaheer J, Seto E. Mobile health for perinatal depression and anxiety: scoping review. J Med Internet Res. 2020;22(4):e17011. 10.2196/17011.

16. Highet N, Gamble J, Creedy D. Perinatal mental health and psychosocial risk screening in a community maternal and child health setting: evaluation of a digital platform. Prim Health Care Res Dev. 2019;20:e14. 10.1017/S1463423618000336.
17. Blackmore R, Boyle JA, Gray KM, Willey S, Highet NJ, Gibson-Helm M. Introducing and integrating perinatal mental health screening: development of an equity-informed evidence-based approach. Health Expect. 2022;25(5):2287–98. 10.1111/hex.13526.
18. Guille C, King C, King K, Kruis R, Ford D, Maldonado L, et al. Text and telephone screening and referral improved detection and treatment of maternal mental health conditions. Health Aff (Millwood). 2024;43(4):548–56. 10.1377/hlthaff.2023.01432.
19. Martin C, Wittkowski A, Agass R, Camacho E, Falana A, Hale R, et al. Digital screening for postnatal depression: a qualitative study and framework analysis exploring the views of healthcare professionals. SSM Ment Health. 2025;8:100549. 10.1016/j.ssmmh.2025.100549.
20. Webb R, Uddin N, Ford E, Easter A, Shakespeare J, Roberts N, et al. Barriers and facilitators to implementing perinatal mental health care in health and social care settings: a systematic review. Lancet Psychiatry. 2021;8(6):521–34. 10.1016/S2215-0366(20)30467-3.
21. Webb R, Ford E, Shakespeare J, Easter A, Alderdice F, Holly J, et al. Conceptual framework on barriers and facilitators to implementing perinatal mental health care and treatment for women: the MATRIx evidence synthesis. Health Soc Care Deliv Res. 2024;12(2):1–187. 10.3310/KQFE0107.
22. Borges do Nascimento IJ, Abdulazeem H, Vasanthan LT, Martinez EZ, Zucoloto ML, Østengaard L, et al. Barriers and facilitators to utilizing digital health technologies by healthcare professionals. NPJ Digit Med. 2023;6:161. 10.1038/s41746-023-00899-4.
23. Berardi C, Antonini M, Jordan Z, Wechtler H, Paolucci F, Hinwood M. Barriers and facilitators to the implementation of digital technologies in mental health systems: a qualitative systematic review to inform a policy framework. BMC Health Serv Res. 2024;24:243. 10.1186/s12913-023-10536-1.
24. Puttemans F, Hompes T, Jansen L, Andreou V, Bruffaerts R, Lannoo L, et al. Equitable and culturally sensitive perinatal mental health screening and referral for all: experiences and needs from primary care and community-based healthcare providers. BMC Health Serv Res. 2026;26:468. 10.1186/s12913-026-14346-z.
25. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry. 1987;150:782–6. 10.1192/bjp.150.6.782.
26. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci. 2011;6:42. 10.1186/1748-5908-6-42.
27. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implement Sci. 2012;7:37. 10.1186/1748-5908-7-37.
28. Atkins L, Francis J, Islam R, O'Connor D, Patey A, Ivers N, et al. A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. Implement Sci. 2017;12:77. 10.1186/s13012-017-0605-9.

29. Michie S, Atkins L, West R. The Behaviour Change Wheel: a guide to designing interventions. London: Silverback Publishing; 2014.
30. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101. 10.1191/1478088706qp063oa.
31. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349–57. 10.1093/intqhc/mzm042.
32. World Health Organization. Guide for integration of perinatal mental health in maternal and child health services. Geneva: World Health Organization. 2022. https://www.who.int/publications/i/item/9789240057142. Accessed 16 Jul 2026.
33. Huddlestone L, Turner J, Eborall H, Hudson N, Davies M, Martin G. Application of normalisation process theory in understanding implementation processes in primary care settings in the UK: a systematic review. BMC Fam Pract. 2020;21:52. 10.1186/s12875-020-01107-y.
34. Odendaal WA, Anstey Watkins J, Leon N, Goudge J, Griffiths F, Tomlinson M, et al. Health workers' perceptions and experiences of using mHealth technologies to deliver primary healthcare services: a qualitative evidence synthesis. Cochrane Database Syst Rev. 2020;3:CD011942. 10.1002/14651858.CD011942.pub2.
35. Brantnell A, Temiz S, Baraldi E, Woodford J, von Essen L. Barriers to and facilitators of the implementation of digital mental health interventions as perceived by primary care decision makers: content analysis of structured open-ended survey data. JMIR Hum Factors. 2023;10:e44688. 10.2196/44688.
36. Pettersen S, Eide H, Berg A. The role of champions in the implementation of technology in healthcare services: a systematic mixed studies review. BMC Health Serv Res. 2024;24:456. 10.1186/s12913-024-10867-7.
37. Powell BJ, Waltz TJ, Chinman MJ, Damschroder LJ, Smith JL, Matthieu MM, et al. A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. Implement Sci. 2015;10:21. 10.1186/s13012-015-0209-1.
38. Alkhaldi O, McMillan B, Ainsworth J. Using the behaviour change wheel to develop a tailored intervention to overcome general practitioners' perceived barriers to referring insomnia patients to digital therapeutic Sleepio. BMC Health Serv Res. 2024;24:967. 10.1186/s12913-024-11384-3.

Supplementary Files

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

- SupplementaryFile1.interview.pdf
- SupplementaryFile2.englishversionquestionnaire.pdf
- TABLESANDSUPPLEMENTARYMATERIAL.docx