

SYSTEMATIC REVIEW

The impact of implementing patient-reported measures in routine maternity care: a systematic review

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Abstract

Introduction: While there is growing interest in applying patient-reported measures (PRMs) in clinical routine, limited collective evidence of the impact of PRMs hinder their widespread use in specific contexts, such as maternity care. Our objective was to synthesize existing empirical evidence on the impact of implementing PRMs in routine maternity care.

Material and methods: We followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines (version 2020). We electronically searched six databases for the literature on the implementation of PRMs in maternity care. A multi-level (woman, clinical, organizational, national and societal) analytic framework for analyzing and synthesizing empirically proven impacts of PRMs was developed. Quality was assessed using the Mixed Method Appraisal Tool. The GRADE-CERQual approach was used to assess the confidence in the review findings and arguments. The protocol was registered in PROSPERO (CRD42021234501).

Results: Overall, 4971 articles were screened. The empirical evidence, collected from 11 relevant studies, showed that the use of PRMs in routine maternity care could produce positive effects on clinical process (assessment and detection of health problems, clinical visit preparation, resource use, woman–professional communication, decision-making, woman–professional relationship, and care quality), and health behavior and outcomes (women's health and wellbeing, quality of life, health behavior, experiences and satisfaction with healthcare services), awareness, engagement and self-management of own health, and disclosure of health issues. The confidence in the review findings was low to moderate due to a limited number of studies, inadequate data and methodological limitations of included studies.

Conclusions: The limited empirical evidence available suggested that the use of PRMs may have positive effects at the individual health level and clinical process level. However, the evidence was not strong enough to provide policy recommendations

Abbreviations: GRADE-CERQual, confidence in the evidence from reviews of qualitative research; PRM, patient-reported measure; SRM, self-reported measures.

Aydin Tekay and Ganesh Acharya contributed equally to this study.

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on the use of PRMs in routine maternity care. This review revealed limitations of currently available research, such as lack of generalizability and narrow scopes in investigating impact. Efforts are needed to improve the quality of research on the use of PRMs in routine maternity care by widening the study population, including different types of PRMs, and considering the effects of PRMs at different levels and domains of healthcare.

KEYWORDS

healthcare quality, impact, implementation, maternity care, patient reported measure, pregnancy and childbirth

1 | INTRODUCTION

Healthcare processes, outcomes and quality are currently measured, but most measurements are performed for the professional side, at the clinical process level (eg preoperative antibiotic coverage before cesarean section), clinical outcomes level (eg glycemic index and blood pressure) or at the public health level (eg disease-specific mortality rates). They are insufficient to fully capture the effects of care on a patient's health status or quality of life. For a greater positive impact on patient satisfaction, safety and wellbeing, performance measurement of healthcare services should include experiences and outcomes as viewed by patients. Patient-reported measures (PRMs) or self-reported measures (SRMs) mainly include patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) and are commonly administrated as standardized, multi-item, self-completed questionnaires. These measures help collect information directly from patients about their health status, health-related quality of life and health service experiences.¹⁻⁴ They are expected to play a more crucial role in improving healthcare quality by promoting patient-centered care and value-based care.⁵⁻⁷ Over the past decades, there has been growing interest in the developing and using PRMs not only in research but also in routine clinical practice. The routine use of PRMs seems particularly important in maternity care, as it has the critical responsibility of monitoring women's health during the course of pregnancy and postnatal period to optimize their physical and mental wellbeing, understanding women's views, perceptions and experiences, maximizing favorable maternal and perinatal outcomes and improving quality of life for both women and their families.²

Some potential impacts of the use of PRMs in clinical routines have long been identified.⁸⁻¹² They include empowering patients, informing clinicians' decisions, and improving the processes and outcomes of care that contribute to healthcare quality.⁸⁻¹² However, widespread use of PRMs in healthcare systems, particularly in the field of pregnancy and childbirth, is still limited.^{5,13} This is partially due to inadequate and inconsistent empirically proven evidence showing the impact of the routine use of PRMs. Previous studies and reviews within specific clinical settings, such as cancer care, management of chronic diseases, and palliative care, indicated that PRMs may have complex and heterogeneous effects on care process and outcomes, influencing patient engagement, patient satisfaction,

Key message

Limited empirical evidence suggests that the routine use of patient-reported measures in maternity care may have positive effects on individual health and clinical process, but current evidence is insufficient, and the confidence in the review findings was low to moderate.

physician-patient communication, patient health behavior, clinical decision making, length of clinical encounter, health outcomes, etc.^{8,11,12,14-18}

To our knowledge, none of the previously collective evidence on the impact of PRMs was specific to maternity care. The evidence and knowledge from other clinical settings in terms of favoring or opposing the routine use of PRMs is fragmented and may not be generalizable across study populations of pregnant and postpartum women. Without clear and convincing empirical evidence, it is premature to make definitive policy or practice recommendations for the use of PRMs in routine maternity care. Thus, there is a need to synthesize existing evidence on the implementation of PRMs in routine maternity care before promoting their use. In this study, we systematically reviewed the literature on the implementation of PRMs in routine maternity care and qualitatively synthesized empirical evidence specifically regarding their impact on maternity care process and outcomes.

2 | MATERIAL AND METHODS

In this present work we synthesize and present the empirical evidence on the impact of implementing PRMs in routine maternity care as a part of a larger systematic literature review project that explores existing evidence, knowledge and experience of implementing and using PRMs in routine maternity care. The protocol is registered in the Prospective Register of Systematic Reviews (PROSPERO) database (CRD42021234501). This review is reported following the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines 2020 (PRISMA 2020) where applicable.¹⁹⁻²¹

2.1 | Searches

The literature search followed the PRESS (Peer Review of Electronic Search Strategies) 2015 guideline.²² Two researchers (AC and KV) developed the primary search strategy, which was reviewed by researcher PT. One librarian provided technical support. The search terms and strategies were informed by previous reviews on the use of PRMs in clinical routines.^{2,9,23} The initial searches, starting in January 2021, were conducted in the following important and popular electronic databases in healthcare and medicine, which were accessible to the researchers: PsycARTICLES, PubMed (NCBI), Scopus, Web of Science, Cochrane Database of Systematic Reviews and Cumulative Index to Nursing and Allied Health Literature (CINAHL). The search terms were derived from three overarching concepts: patient-reported measure, maternity care and implementation. The full strategy of the initial search conducted in different databases is provided in Table S1. In additional searches, a snowballing strategy was applied by going through references in the articles already included in the study, as well as articles citing them. We also searched the studies included in previous reviews that identified PRMs used in pregnancy and childbirth.^{2,24–30} Additional searches were continued until no other relevant studies were found.

2.2 | Eligibility criteria

In this review, we defined PRMs as self-administrated questionnaires, instruments or tools that help to collect information directly from patients, which measure (1) patients' health status, (2) patients' perceived effects of treatments and interventions on their health and (3) patient experiences and satisfaction with health services.^{9,31,32} A PRM was considered to be a standardized or validated measure if the study itself or another published study reported the measure's validity, reliability, sensitivity or responsiveness, as described by the Consensus-Based Standards for the Selection of Health Measurement Instruments (COSMIN) group.²⁹ We only included studies that applied at least one validated PRM to collect data. In Table S6, validated PRMs used in included studies are presented.

We built a review database with studies that provided evidence-based knowledge or practical experience of using PRMs in routine maternity care. We focused on the routine use of PRMs for assessing pregnant or postpartum women's health status across care process, monitoring women's health progress, measuring the results of treatment, and evaluating the service quality. Studies reporting the use of PRM in other clinical fields rather than pregnancy and childbirth or studying the implementation of PRM in healthcare in general were excluded. We also excluded studies that were concerned solely with the devolvement and/or validation of PRMs rather than their implementation in routine clinical practice. Table S2 provides a full list of the inclusion and exclusion criteria used for building the review database.

For the analysis of the impact of using PRMs in routine maternity care, we only selected from our review database the

post-implementation studies that provided empirical evidence (based on observation, measurement or actual experience, rather than belief, expectation or theoretical formulation) of the impact of the use of PRMs in routine maternity care.

2.3 | Study screening and selection

Studies retrieved from the identified databases were imported to Endnote 20 for screening. After duplicates were eliminated, a 2-step screening process was performed to form our review database. First, "title screening" was performed. Researcher AC screened the studies using predetermined exclusion criteria and categorized them into "removed after title screening" and "remaining after title screening" groups for researcher KV to check. Consensus was reached through discussion or consultation with a third researcher (PT). Subsequently, "abstract screening" was conducted. Two researchers (AC and KV) independently read the remaining abstracts after title screening and categorized the studies (1—included, 2—excluded and 3—not sure). Cohen's kappa coefficient was used to measure the inter-rater reliability of the abstract screening. Table S3 shows that the level of agreement between the researchers (98.48%) was high, and the inter-rater reliability (0.81) was almost perfect. Disagreements between the researchers (AC and KV) in this step were resolved through discussion or by involving a third researcher (PT). The exclusion criteria were refined during the discussions. Title and abstract screening produced a list of potentially eligible studies. The full texts of these studies were retrieved and assessed by researcher AC against inclusion and exclusion criteria and checked by KV. After several rounds of full-text reading and discussions between the primary researchers, a review database was generated, from which researcher AC made a further selection and identified post-implementation studies that provided empirical evidence of the impact of the use of PRMs in routine maternity care. Researcher KV double-checked the selection.

2.4 | Data extraction

Based on this review's purpose, informed by earlier reviews on the implementation of PRMs, and applying standard instruments developed by the Cochrane Collaboration^{33,34} and Joanna Briggs Institute,³⁵ a data extraction form was created in Microsoft EXCEL. The data extraction form was piloted in two articles and improved based on the pilot by two researchers (AC and KV). The information extracted from each study included study characteristics (eg title, author, country, study type/design/methods), implementation details (eg implementation context/setting, purpose of administrating PRMs, validated instruments in use), key findings, author's interpretation of results, author-proposed recommendations and suggestions for PRM implementation, and author-identified limitations and future research opportunities. Table S4 lists all the items defined in the data extraction form. In the formal extraction process, data were extracted by researcher AC and checked for accuracy by researcher KV.

2.5 | Data analysis and synthesis

In this review, we descriptively and qualitatively synthesized evidence on how the use of PRMs in routine maternity care would change maternity care process, outcomes and even the service system, which could be observed by researchers or perceived and reported by women and other stakeholders. Thematic analysis combined with narrative synthesis was performed.³⁶ Informed by concepts, constructs and frameworks used in previous research^{8,11,12,16-18,31,37-44} for assessing the impact of using PRMs in clinical practice and based on discussions and workshops within the research team, we developed a multi-level (patient, clinical, organizational, national and level) analytic framework for analyzing and synthesizing the "PRMs impact"-related empirical evidence presented in included studies. Under each level, there were different domains of impact. Table S5 shows the analytic framework. All the quantitative and qualitative evidence about the impact of using PRMs presented in each study was identified and interpreted by two researchers (AC and KV), placed at appropriate levels of a predefined framework, and grouped into certain domains. The evidence (identified in Results, Findings and Conclusions) reflecting similar effects was descriptively gathered, and the original texts showing the evidence were extracted and kept. Quantitative data was converted into qualitative description or interpretation. After aggregating the evidence from included studies, we identified the patterns across the studies and made a summary for each domain.

2.6 | Quality and confidence assessment

As the studies selected for this review used a range of study designs, and evidence generated by the studies was presented in various forms, the Mixed Method Appraisal Tool (Version 2018)⁴⁵ that enables researchers to separately score the quality of different types of studies and deliver an integrative assessment of the literature base was applied to assess the quality and risk of bias of the included studies. First, the studies were assessed using two general criteria: (1) Are there clear research questions? (2) Do the collected data address the research questions? The studies that passed the first-step assessment were grouped into different categories and scored for quality against five appraisal criteria specific to study types (study is given one point if meeting one criterion; 5 is the full score). Table S7 shows the use of Mixed Method Appraisal Tool and the specific appraisal questions for different types of studies. Studies with a score of 1/5 or 2/5 from the appraisal were deemed to be of low quality, studies with 3/5 or 4/5 moderate quality, and studies with a full score of 5 were deemed to have a high quality. Two researchers (AC and KV) independently assessed the quality of each study, cross-checked the results of the appraisals, and reached a consensus after discussions. No studies were excluded if they passed the first step of assessment by Mixed Method Appraisal Tool, because this review purposely collected all relevant evidence, knowledge and experience on the implementation of maternity care-related PRMs.

The GRADE-CERQual (confidence in the evidence from reviews of qualitative research) approach was applied to evaluate the reliability of the evidence gathered by this review and assess the confidence in the findings and arguments generated by this review.^{42,46-53} The findings in each domain were assessed separately. Table S8 shows the use of the GRADE-CERQual tool in this review.

3 | RESULTS

3.1 | Selection and inclusion of studies

Overall, 4971 records were retrieved from electronic searches in PsycARTICLES (249), PubMed (1318), Scopus (876), Web of Science (1435), Cochrane Database of Systematic Reviews (187) and CINAHL (906). After eliminating duplicates, abstract browsing and full-text reading, five studies from the initial search were added to our review database. Starting with these five studies, we conducted an extensive additional search that helped identify another 21 studies. Consequently, a total of 26 studies were included in our database for the systematic review on the implementation of PRMs in routine maternity care. Of these, 11 studies were considered eligible for this review that collected empirical evidence of the impact of the use of PRMs in maternity care. The search, screening and selection processes are described in Figure 1.

3.2 | Characteristics of studies included in the review on the impact of PRMs in maternity care

Eleven studies,⁵⁴⁻⁶⁴ published between 2004 and 2021, were included in this review. An overview of these studies with selected basic information and the evidence of the impact of PRMs is provided in Table S6. Table 1 summarizes the characteristics of the studies in terms of countries, geographic areas, publication types, PRM data collection approaches, health or healthcare issues addressed by PRMs, study designs and study participants.

3.3 | Findings about the impact of implementing PRMs in routine maternity care

From the collected evidence, this review identified the impact of using PRMs in maternity care routine at two levels: woman level (ie "patient level" of the predeveloped analytic structure) and clinical level. The three other levels from the predefined analytic framework (organizational, national and societal) were not addressed in the studies.

Nine studies^{54-59,61,62,64} provided evidence of the impact of using PRMs in maternity care routine at the woman level. The collected evidence showed that the use of PRMs could help to improve women's health, quality of life and well-being, change women's health behavior, improve women's experiences and satisfaction with

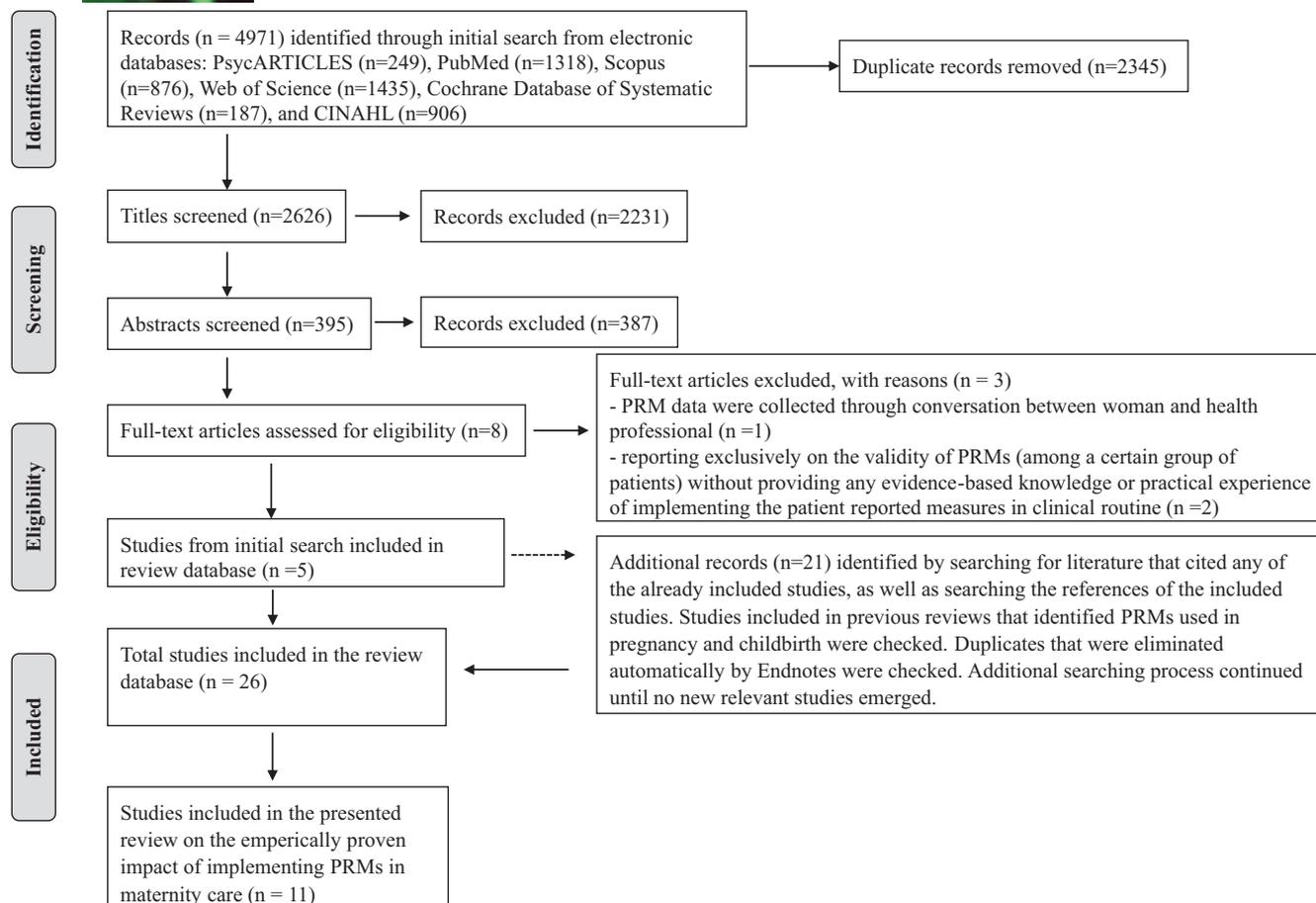


FIGURE 1 Flow diagram of search, screening and selection process of studies included in the systematic review. PRM, patient-reported measure.

healthcare services, and increase women's awareness, engagement and self-management of their health; it can also help women in disclosing information they may have not otherwise been able or comfortable to disclose.

Six studies^{54,57,58,60,61,63} provided evidence of the impact of using PRMs in routine maternity care at the clinical level. The collected evidence showed that the use of PRMs could help to detect and assess health problems, help in preparing clinical visits and in better using clinical resources, support communication during visits, facilitate shared decision-making, support the woman–health professional relationship, and help in delivering appropriate, personalized care. [Tables 2](#) and [3](#) summarize the empirical evidence that shows the impact of using PRMs in maternity care routine at the woman level and the clinical level, respectively.

3.4 | Assessment of included studies and synthesized evidence

The overall quality of these 11 studies included in this review was acceptable. Studies varied in methodologic quality, from moderate to high. Five^{55–57,62,64} (45.5%, three qualitative studies^{55,57,62} and two quantitative studies^{56,64}) were rated as high quality and

six (54.5%, all quantitative studies)^{54,58–61,63} as medium quality. Main methodologic limitations identified across quantitative studies included insufficient information about the representativeness of samples to the target population ($n = 4$),^{58–61} and the obscurity in the risk of bias caused by nonresponse and missing data ($n = 3$).^{58,61,63} The confidence in the review findings was low to moderate, mainly because of methodologic limitations and data inadequacy of original studies. Generally, data and findings were reasonably consistent within and across all studies. However, there was one conflicting observation: whereas the evidence from Austin et al.,⁶⁴ Doherty et al.,⁵⁸ and Nishizono-Maher et al.⁵⁴ indicated that self-reported measures could help to better detect health problems and identify important issues when compared to other modes of inquiry (eg interviewer-administrated measures), Reilly et al.⁶⁰ showed that there were no significant differences in the detection of women with current major depression between the interviewer-administered and self-administered versions. Reilly et al.⁶⁰ also showed that a greater proportion of women in the interviewer-administered phone group as compared with women in the self-completed online group met criteria for current minor depression and reported a past depressive or a past anxiety disorder. The quality assessment of the studies included in the review and the confidence in review findings are shown in [Tables S7](#) and [S8](#).

TABLE 1 Summary of the characteristics of included studies

Characteristics of included studies	Overall (n = 11)
Countries	
Australia	4 (36.36%)
Canada	2 (18.18%)
United Kingdom	1 (9.10%)
Netherlands	1 (9.10%)
Denmark	1 (9.10%)
Spain	1 (9.10%)
Japan	1 (9.10%)
Geographic areas	
Europe	4 (36.36%)
Australia	4 (36.36%)
North America	2 (18.18%)
Asia	1 (9.10%)
Publication types	
Journal article	9 (81.82%)
Conference paper	2 (18.18%)
PRM data collection approach	
Digital	9 (81.82%)
Paper-based	3 (27.27%)
Issues addressed by PRMs	
Mental health related issues	9 (81.82%)
Multiple issues	2 (18.18%)
Methodology	
Quantitative studies	8 (72.73%)
Qualitative studies	3 (27.27%)
Study participants (n = 4971)	
Women (n = 4965, 99.88%)	11 (100%)
Health professionals and other stakeholders (n = 6, 0.12%)	1 (9.10%)

4 | DISCUSSION

This review, which qualitatively synthesizes empirical evidence specifically regarding the impact of the use of PRMs in routine maternity care, tentatively suggests that the systematic use of PRMs may have positive effects on maternity care processes and health outcomes. More specifically, it suggests that PRMs may positively influence multiple aspects of routine maternity care, such as women's childbearing-related health behavior, women's experiences and satisfaction with maternity care services, women's awareness and engagement in managing their own health, disclosure of health and general life issues to health professionals, general detection and assessment of health problems, preparation for clinical visits, utilization of clinical resources, communication between women and health professionals, shared decision-making, the woman-professional relationship, and overall quality of care. The evidence collected from the literature was generally

consistent. Our observations support the findings of some previous systematic reviews on the impact of the routine use of PRMs in different medical specialties and contexts. Focusing on treatment for non-malignant pain, Holmes et al.⁴² found that PRMs impacted the patient outcomes, helped in assessment, had an effect on patient engagement, facilitated shared decision-making, improved communication between patients and clinicians, and influenced the therapeutic relationship. In an oncologic setting, Chen et al.¹¹ also identified convincing evidence of the impact of PRMs in improving patient-provider communication, patient satisfaction and the detection of unrecognized problems. A review by Marshall et al.¹² found consistent evidence showing that PRMs have a fairly substantial positive impact on the detection of mental health conditions. However, the heterogeneity of research designs and measurements of "impact" applied in included studies prevented the performance of meta-analyses.

Our review found mixed evidence regarding the impact of PRMs on the detection of health problems: while three studies^{54,58,63} reported quantitative evidence showing that PRMs could increase the detection rate of health problems, one study,⁶⁰ which also reported quantitative evidence, indicated that PRMs may not significantly influence detection and that any influence may depend on the severity of health issues. The weakness and inconsistency of evidence about the impact of PRMs in detection add to concerns about whether higher detection by PRMs could prevent women from being left unsupported or lead to unnecessary referral for additional assessment at the expense of scarce health resources.⁶⁰

We observed that a high portion of studies included in this review (9 of 11) used PRMs that specifically addressed mental health-related issues. This observation was consistent with the finding of Dickinson et al.² that five of six studies included in their review used mental health-specific PRMs or PRMs including mental health-related questions, and that 12 of 14 PRMs used in reviewed studies were concerned with mental health issues during pregnancy and childbirth. This might be due to the phenomenon that mental health-related PRMs are more commonly and widely used in maternity care than PRMs that address other health issues. Thus, the findings about the impact of using PRMs in routine maternity care may not be generalizable to all maternity care-related PRMs.

Due to the primary concerns related to the low volume of participants, limited diversity of population, narrow scopes, methodologic limitations and lack of generalizability of primary studies identified and included in this review, our confidence in the review findings was low to moderate. Similar to many other reviews conducted on the impact of PRMs,^{11,16,18,42,43} due to insufficient evidence we were unable to build a systematic and comprehensive understanding of how PRMs might impact clinical practices, health outcomes and care quality. Thus, the full potential of PRMs remains unknown.

The insufficiency of current evidence requires more research including various measures, diverse outcomes, wider populations and better quality data. Different validated and standardized maternity related measures (general or specific) should be considered in future

TABLE 2 Synthesized empirical evidence of the impact of implementing self-reported measures in routine maternity care—woman level

Domains	Review of findings with evidence extracted from studies
Women's health, quality of life, and well-being (study n = 1)	<p>The use of self-reported measures can improve women's well-being.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> One fourth (25%) of the sample (women) perceived an improvement in their emotional well-being after using the (HappyMom) platform (an online program for perinatal depression self-reported screening). (Martínez-Borba et al.⁵⁹)
women's health behavior (study n = 1)	<p>The use of self-reported measures can change health behaviors to support wellness.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Of note, most pregnant and postnatal users regarded mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) as potentially helpful in affecting a range of health behaviors specific to supporting emotional wellness during the perinatal period (78.1%–92.5%). (Martínez-Borba et al.⁵⁹)
Women's experiences and satisfaction with healthcare services (study n = 3)	<p>The use of self-reported measures can make women feel heard, cared for and supported, and feel more comfortable in seeking support for their health.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Women (89% antenatal, 84% postnatal) agreed that "the use of mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) helps reduce the stigma of seeking help for emotional health issues during pregnancy and in the year after birth, if I needed it". (Reilly & Austin⁶⁴) Women (85% antenatal, 83% postnatal) agreed that "mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) would help me feel more comfortable in seeking support for emotional health issues during pregnancy and in the year after birth, if I needed it". (Reilly & Austin⁶⁴) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> Women felt cared for and supported. (Willey et al.⁶²) This (self-reported questionnaire) led to feelings of being heard. (Johnsen et al.⁵⁷)
Women's awareness, engagement and self-management (study n = 6)	<p>The use of self-reported measures can help women reflect on their health behavior and lifestyle, pay closer attention to their health, increase awareness of their health status and risks, learn about and understand both normal and abnormal aspects of pregnancy and childbirth, such as risk factors, concerning symptoms and other health issues, and manage their own health.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Women (14/62, 22.58%) stated that the (self-reported questionnaires) app helped them to engage in mindful refection. (Doherty et al.⁵⁸) Women (80% antenatal, 54% postnatal) agreed that "mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) will help me pay closer attention to my emotional health and well-being". (Reilly & Austin⁶⁴) Women (86% antenatal, 91% postnatal) agreed that "mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) helped me learn about some common risk factors for depression and anxiety during pregnancy and in the year after birth". (Reilly & Austin⁶⁴) Women (78% antenatal, 91% postnatal) agreed that "mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) helped me learn about the symptoms of depression". (Reilly & Austin⁶⁴) Women (89% antenatal, 93% postnatal) agreed that "the information in mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) helped me better understand the importance of having good emotional health in the transition to motherhood". (Reilly & Austin⁶⁴) Women (86% antenatal, 88% postnatal) agreed that "mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) increased my awareness of additional resources for emotional well-being during pregnancy and in the year after birth" (Reilly & Austin⁶⁴) Women (86% antenatal, 91% postnatal) agreed that "the information provided in mummatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) could help me manage my emotional well-being in the future" (Reilly & Austin⁶⁴) Over half (60%) of women agreed PROMs/PREMs increased their ability to raise issues. (Depla et al.⁶¹) The use of the (self-reported) questionnaire was helpful in drawing the attention of mothers and healthcare professionals to issues of mental health. (Nishizono-Maher et al.⁵⁴) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> In the home setting, women used the (self-reported) questionnaire as a reflective instrument, illustrated by accounts of their awareness of their pregnancy behavior in relation to the health of the unborn child. (Johnsen et al.⁵⁷) The (self-reported) questionnaire served to remind the women of the importance of maintaining a healthy lifestyle during pregnancy. (Johnsen et al.⁵⁷) Answering (self-reported) questions about personal lifestyle was described to increase awareness of how to live everyday life. (Johnsen et al.⁵⁷) Answering (self-reported) questions about previous illnesses seemed to make some women more aware of risks of which they had not previously been aware. (Johnsen et al.⁵⁷) For other women, the questionnaire increased perceptions of potential risks. (Johnsen et al.⁵⁷) The women also saw the use of their (self-reported) information as a token of personal recognition, which contributed to feelings of having legitimate needs. (Johnsen et al.⁵⁷) (Self-reported) questions related to alcohol consumption prior to and during pregnancy evoked feelings of guilt among some of the women. (Johnsen et al.⁵⁷) For some women the (self-reported) questionnaire served as a means to confirm a "normal" pregnancy. Here the word "normal" was used to describe several dimensions, such as not being physically or mentally ill. Reporting an appropriate lifestyle also made women feel normal. Finally, normality was related to the possession of material goods, such as adequate housing and a stable income to provide for the newborn. Thus, the questionnaire came to serve as a checklist, where answering the questions contributed to perceptions of being normal. For some women, normality led to feelings of being privileged or lucky. (Johnsen et al.⁵⁷) (Self-reported questions) encouraged women to talk about their feelings and helped them to understand normal changes that occur in early pregnancy. (Willey et al.⁶²)

TABLE 2 (Continued)

Domains	Review of findings with evidence extracted from studies
Disclosure (study = 7)	<p>The use of self-reported measures that had structured inquiries, offered enough time for women to think, and were delivered with a sense of anonymity, support disclosure.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> • Women (86% antenatal, 87% postnatal) agreed that "mumatters (a web-based health tool that allows women to self-assess the symptoms of depression and the presence of psychosocial risk factors throughout pregnancy and the postnatal period) would help me talk to my health care provider about my emotional well-being, if I needed to" (Reilly & Austin⁶⁴) • Over half (60%) of women recognized that PROMs helped their ability to raise issues (Depla et al.⁶¹) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> • In our study, some participants who preferred "paper-based" screening explained that they did not want to become emotional in the presence of others. Two women explained that this method would give them some time to think and provide "the best answer". (Bayrampour et al.⁵⁵) • Most participants explained that this approach (self-reported approach) would give them time to think and to ensure they answered questions accurately, while others reported that this approach would give them time to think about the answer that they wanted to share. (Bayrampour et al.⁵⁵) • A preference for completing the screening by themselves was suggested by many women, as this improved privacy and facilitated more truthful answers. Women particularly liked the idea of completing screening on their own, as it may offer more privacy and elicit more truthful answers. According to women's experiences, self-reported questionnaires encouraged them to talk about their feelings and provided the opportunity to share or express feelings. Many suggested that the screening helped them to open up and release feelings, and to express feelings that otherwise would not have been discussed with health professionals. (Willey et al.⁶²) • Women found that completing the (self-reported) screening facilitated a discussion with midwives that they may not have otherwise had. (Willey et al.⁶²) <p>Evidence from observation studies</p> <ul style="list-style-type: none"> • Those (women) who reported not always being honest during face-to-face assessments showed a greater increase in psychosocial risk score when the assessment was repeated online via self-report, compared with women who were always honest. The Time 2 EPDS, GAD-7 and ANRQ-R mean scores were also all significantly higher in the "not always honest (at face-to-face assessment)" group than in the "always honest (at face-to-face assessment)". Moreover, 24.1% of the "not always honest (at face-to-face assessment)" women scored 10 or more on the EPDS vs 9.9% in the "always honest (at face-to-face assessment)" group; and 7.3% women who were "not always honest (at face-to-face assessment)" scored 13 or more on the EPDS vs 4.7% women who were "always honest (at face-to-face assessment)", although this was not statistically significant ($p = 0.162$). Overall, 11.2% of participants ($n = 193$) reported not always being honest (at face-to-face assessment) when responding to the psychosocial questions with their midwife at the booking-in assessment. There were 60 (3.4%) women in our sample who did not respond when asked about honesty at psychosocial health assessment with their midwife. Women who reported not always being honest (at face-to-face assessment) had higher ANRQ-R total scores overall than women who were always honest (at face-to-face assessment), and the impact of mode of administration on their scores was more pronounced. Specifically, women who reported not always being honest with their midwife at assessment showed a significant increase in scores (moderate effect size) when completing the repeat ANRQ-R via online self-report (mean [M] = 17.66) than face-face with their midwife ($M = 13.87$), compared with women who were always honest ($M = 12.37$ vs $M = 13.19$, respectively). (Austin et al.,⁶⁴) • The more "anonymous" mode of assessment (self-reported mode) was associated with a greater increase in ANRQ-R scores (suggesting increased reporting of psychosocial risk) in the "not always honest" group compared with women who were "always honest". (Austin et al.,⁶⁴) • During this study, 39 women disclosed a risk of depression, self-harm or suicide and received immediate midwife support. Two-thirds of participants who received support in this way registered no risk of depression according to standard screening methods employed in-clinic at baseline. These figures suggest the potential of a mobile application deployed on women's personal devices to overcome stigma and support disclosure, facilitating care and support for those in need. (Doherty et al.⁵⁸) • Overall, women in both e-screening and paper-based screening groups indicated that they would be able to disclose their concerns about their mental health (Table 2). There was no significant difference between groups on the item "I was able to tell the truth on all the questions about emotional health", with 94.1% (284/302) of women in the e-screening intervention group and 90.2% (293/325) in the paper-based control group somewhat or strongly agreeing they could tell the truth on all questions. In addition, few women in both groups indicated that they would find it difficult to answer how they felt with e-screening. (Kingston et al.⁵⁶) • Self-completed instruments—where precision of the measure can be assured—have a number of advantages, including a standardized approach to data collection and increased flexibility for patients and participants. (Reilly et al.⁶⁰)

Abbreviation: PREM, patient reported experience measure.

studies. Further research is clearly needed to provide specific evidence addressing whether PRMs have any effects on domains at the organizational level (eg resource arrangement and allocation, frequency of resource use, operational efficiency and managerial decision-making), the regional and national level (eg benchmarking and learning across institutions and health sectors) and the society level (eg family and population wellbeing). In the included studies, implementation of PRMs was evaluated mainly based on women's perceptions and experiences. More frontline professionals working in maternity care should be consulted and included in study population, and the changes in healthcare process and outcomes should also be quantitatively measured. More attention needs to be paid

to middle- and low-income countries and regions. Methodologically stronger studies, such as well-planned and properly executed process and outcome evaluation using appropriate, standard methods, are warranted to evaluate the impact of using PRMs in maternity care routine and exploring associated mechanisms.

To our knowledge, this is the first systematic review on the impact of using PRMs in routine maternity care. This review followed the updated version of the PRISMA. For this review, we carried out a comprehensive search for eligible studies, using multiple electronic databases, followed by thorough manual searching. Although we did not search Embase separately, as the Scopus database includes almost all Embase content as well as the Embase index terms, it is

TABLE 3 Synthesized empirical evidence of the impact of implementing self-reported measures in routine maternity care—clinical level

Domains	Review findings with evidence extracted from studies
Health problem detection, assessment and diagnosis (study = 6)	<p>The use of self-reported measures can help to detect and assess health problems and identify important issues.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Healthcare providers (83%) agreed that self-reported measures support identify what matters to their patients and it was clear in advance which subjects were important for their patients to address. (Depla et al.⁶¹) How professionals value self-reported measures also appeared from thematic analysis, indicating better insight in subjects that are important to their patients and easier detection of psychological issues or pelvic floor problems. (Depla et al.⁶¹) Professionals agreed that the self-reported measures aided in the detection of symptoms (100%) and supported the identification of subjects that mattered to patients (83%). (Depla et al.⁶¹) Relative advantages of discussing individual outcomes in clinical practice were experienced by both women and professionals, acknowledging it could improve insight into health status. (Depla et al.⁶¹) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> The women generally agreed that one of the main purposes of the questionnaire was to assess whether they could be at increased risk during pregnancy. (Johnsen et al.⁵⁷) <p>Evidence from observation studies</p> <ul style="list-style-type: none"> Two-thirds of high-risk women who were identified by self-report mental health screening application were not identified by screening in-clinic. (Doherty et al.⁵⁸) Among mothers with 3- to 4-month-old babies in the community, 13.9% scored high (9 or above) on EPDS (detected by self-reported approach). In 51.1% of high scorers (detected by self-reported approach), nurses did not detect postnatal depression. Of the 96 women who scored 9 or above (by self-reported questionnaires), 88 agreed to be interviewed in detail by community nurses. Among these women, 45 (51.1%) had not been identified by nurses for possible postnatal depression. (Nishizono-Maher et al.⁵⁴). Those (women) reporting not always being honest at face-to-face assessment showed a greater increase in psychosocial risk score when the assessment was repeated online via self-report, compared with women who were always honest. The Time 2 EPDS, GAD-7 and ANRQ-R mean scores were also all significantly higher in the “not always honest (at face-to-face assessment)” group than in the “always honest (at face-to-face assessment)”. Moreover, 24.1% of the “not always honest (at face-to-face assessment)” women scored 10 or more on the EPDS vs 9.9% in the “always honest (at face to face assessment)” group; and 7.3% women who were “not always honest (at face-to-face assessment)” scored 13 or more on the EPDS vs 4.7% women who were “always honest (at face-to-face assessment)”, although this was not statistically significant ($p = 0.162$). Overall, 11.2% of participants ($n = 193$) reported not always being honest (at face-to-face assessment) when responding to the psychosocial questions with their midwife at the booking-in assessment. There were 60 (3.4%) women in our sample who did not respond when asked about honesty at psychosocial health assessment with their midwife. Women who reported not always being honest (at face-to-face assessment) had higher ANRQ-R total scores overall compared with women who were always honest (at face-to-face assessment) and the impact of mode of administration on their scores was more pronounced. Specifically, women who reported not always being honest with their midwife at assessment showed a significant increase in scores (moderate effect size) when completing the repeat ANRQ-R via online self-report ($M = 17.66$) than face-face with their midwife ($M = 13.87$), compared with women who were always honest ($M = 12.37$ vs $M = 13.19$, respectively). (Austin et al.⁶⁴) There were no significant differences in the proportions of women meeting eMINI 6.0 criteria for current major depression, any current anxiety disorder, or lifetime panic or depressive disorder, by mode of administration (self-reported vs interviewer-administered). There are minimal discrepancies between the interviewer-administered and self-administered versions. However, a greater proportion of women in the interviewer-administered phone group than in the self-complete online group met criteria for current minor depression (2.0% vs 0.2%, $p = 0.008$). In this study, the difference in the overall proportions of pregnant women meeting criteria for a past depressive or past anxiety disorder were 19.0% for the interviewer-administered and 14.3% for the self-completed versions of the eMINI 6.0. Post-hoc power analyses indicate that we only had 40% power to detect such a difference as being statistically significant. (Reilly et al.⁶⁰)
Woman–health professional communication (study = 2)	<p>The use of self-reported measures can support clinical visits.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Half (50%) of women recognized that patient-reported outcome measures helped them prepare for the visit. (Depla et al.⁶¹) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> Some women saw the questionnaire as an invitation to set the agenda for the coming midwifery visit. For these women, the questionnaire became a personal aid, which could ensure the visit was tailored according to their individual needs. (Johnsen et al.⁵⁷)

TABLE 3 (Continued)

Domains	Review findings with evidence extracted from studies
Resources utilization (study = 2)	<p>The use of self-reported measures can help to prepare clinical visits, properly use visit time, and save time for health professionals.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Over half (50%) of women recognized that patient-reported outcome measures helped them prepare for the visit. (Depla et al.⁶¹) On average, discussing patient's answers took them 10 min (range 3–20 min). At two of five timepoints, the majority of professionals (50% at T1 and 75% at T5) felt they were short of time to discuss all issues raised in patient's questionnaires. Time spent on discussing the answers did not correlate with the amount of questions that patients had answered. Thematic analysis showed this time was more dependent on the amount of issues raised. Professionals could also gain time because it was clear in advance which subjects were important for their patient to address. To attain this advantage, they argued that insight in the answers before the visit is crucial, emphasizing the need for a well-supporting IT system. Also, to relieve their time burden, support of administrative staff was proposed, for example, in explaining the purpose and process of the questionnaires to patients. (Depla et al.⁶¹) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> Women saw the questionnaire as a way to ensure proper use of time during the first visit. (Johnsen et al.⁵⁷) Some women saw the questionnaire as an invitation to set the agenda for the coming midwifery visit. For these women, the questionnaire became a personal aid, which could ensure the visit was tailored according to their individual needs. (Johnsen et al.⁵⁷) <p>Evidence from observation studies</p> <ul style="list-style-type: none"> Observations indicated that the (self-reported online) questionnaire contributed to a decrease in the midwives' documentation tasks during the visit. (Johnsen et al.⁵⁷)
Shared decision making (study = 1)	<p>The use of self-reported measures can support shared decision-making.</p> <p>Evidence from survey studies</p> <p>Over half (58%) of women agreed self-reported measures supported shared decision making. (Depla et al.⁶¹)</p>
Woman–health professional relationship (study = 2)	<p>The use of self-reported measures can support the woman–health professional relationship.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Over half (52%) of women agreed self-reported measures supported the patient–clinician relationship. (Depla et al.⁶¹) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> Women reported that utilization by the midwife of the information collected via self-reported measures led to feelings of being heard and establishing a partnership with the midwife. (Johnsen et al.⁵⁷)
Personalized care (study = 2)	<p>The use of self-reported measures can support appropriate, personalized care.</p> <p>Evidence from survey studies</p> <ul style="list-style-type: none"> Professionals (100%) agreed that the PROMs contributed to more appropriate care. (Depla et al.⁶¹) <p>Evidence from interview studies</p> <ul style="list-style-type: none"> Some women saw the questionnaire as an invitation to set the agenda for the coming midwifery visit. For these women, the questionnaire became a personal aid, which could ensure the visit was tailored according to their individual needs. (Johnsen et al.⁵⁷)

unlikely that we have missed any relevant literature. Our analysis was guided by a well-developed framework, ensuring that this topic was systematically examined. Although thorough and comprehensive searches were performed to identify potential studies for inclusion, the searches might still be inefficient. We assessed the search using Peer Review of Electronic Search Strategies (PRESS) 2015 Evidence-Based Checklist²² (please see Table S9). The fact that our initial search identified five studies while 21 were obtained through additional searching was probably due to the limitations in the search terms. Some terms appearing in studies obtained by additional search, such as “self-administrated” and “self-completed”, were commonly used for research-oriented surveys rather than routine care practice-related studies, so they were not included in the initial search. The use of term “screening” resulted in a large volume of irrelevant literature and therefore this term was not included in the initial search. During search, we realized that there was no standard definition of PRM and that the shortages in terminology

development and standardization of this concept made the search challenging. To make up for those shortages in the initial search, we applied a very extensive additional search. In addition, we have to acknowledge that this systematic review only included articles written in certain languages, which may limit its international scope and generalizability. Furthermore, there is a possibility that some implementation projects may have taken place but were not reported, as we did not include unpublished data in this systematic review.

5 | CONCLUSION

We systematically reviewed studies that have assessed the impact of implementing PRMs in routine maternity care. Tentative and limited evidence suggests that the use of PRMs may have positive effects at the individual health level and the clinical practice level. Although the findings were subject to considerable uncertainty and

provided little support for policy recommendations on the use of PRMs in routine maternity care, this review provided insights into the current status of evidence available in this area that may inform future research and implementation work related to the use of PRMs in maternity care as well as in other clinical settings.

AUTHOR CONTRIBUTIONS

AC: conceptualization, methodology, formal analysis, investigation, data curation, writing - original draft, writing - review & editing, visualization, funding acquisition. KV: conceptualization, methodology, formal analysis, investigation, writing - review & editing, funding acquisition. AS: formal analysis, investigation, writing - review & editing. RL, PL, SH: conceptualization, methodology, investigation, writing - review & editing, funding acquisition. AT: conceptualization, methodology, investigation, writing - review & editing, funding acquisition, resources, project administration. GA: conceptualization, methodology, investigation, writing - review & editing.

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CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

DATA AVAILABILITY STATEMENT

Please contact the corresponding author to request original database, codes and other materials.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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