

# Supplementary Information

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Scoping review of governance, privacy, and design in AI-supported conversational agents for perinatal mental health

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| Supplementary Data 1  | Extraction dataset, Governance Maturity Score and statistical analyses (14 sheets; legend below) | Separate Excel file |

**Supplementary Table 1 | Six recurring design tensions (identified in 28 of 35 studies).**

| S/N | Tension                                       | Trade-off                                                                                                                                                                                            | Illustrative systems and studies                                                                 |
|-----|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1   | Safety versus autonomy                        | Constrained interaction improves control but limits responsiveness; open-ended generation increases flexibility but also safety uncertainty.                                                         | Parentbot (Studies 1, 17, & 34); ALBA (Studies 14 & 22); NurtureBot (Study 7); MOMCare (Study 6) |
| 2   | Scale versus personalisation                  | Broad, low-resource delivery supports reach but may limit tailoring; greater personalisation increases data, infrastructure and computational demands.                                               | Zuri (Study 2); Rover (Studies 27 and 35); Moment for Parents (Study 28)                         |
| 3   | Clinical accuracy versus accessibility        | Clinically detailed content may be harder for users to understand, while simplification can improve accessibility but reduce nuance or clinical precision.                                           | DIAN (Study 12); Maria (Study 19)                                                                |
| 4   | Privacy versus personalisation                | Greater personalisation often requires more user data, increasing tension with data minimisation and privacy protection.                                                                             | PPD screener (Study 4); HiBaby (Study 25); Woebot (Studies 5 & 30)                               |
| 5   | Automation versus clinical oversight          | Automation supports scalability and reduces reliance on limited clinical capacity, but complicates human oversight and integration with health services when needs exceed the system's capabilities. | e-Midwife (Study 15); Dr. Joy (Study 18); Rosie (Study 29); Zuri (Study 2);                      |
| 6   | Father inclusion versus focused maternal care | Maternal-focused design excludes fathers and non-birthing partners; broader inclusion reduces father-specific tailoring and increases the support and escalation demand a system must meet.          | Parentbot (Study 17); Dr. Joy (Study 18); Rover (Studies 27 and 35); NurtureBot (Study 7);       |

**Supplementary Table 2 | PRISMA-ScR checklist**

| SECTION                           | ITEM | PRISMA-ScR CHECKLIST ITEM                                                                                                                                                                                                                                                 | REPORTED ON PAGE #                                                                                                                                                          |
|-----------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TITLE</b>                      |      |                                                                                                                                                                                                                                                                           |                                                                                                                                                                             |
| Title                             | 1    | Identify the report as a scoping review.                                                                                                                                                                                                                                  | Title page.                                                                                                                                                                 |
| <b>ABSTRACT</b>                   |      |                                                                                                                                                                                                                                                                           |                                                                                                                                                                             |
| Structured summary                | 2    | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.                                             | Abstract.                                                                                                                                                                   |
| <b>INTRODUCTION</b>               |      |                                                                                                                                                                                                                                                                           |                                                                                                                                                                             |
| Rationale                         | 3    | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.                                                                                                  | Introduction.                                                                                                                                                               |
| Objectives                        | 4    | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives. | Introduction, final paragraph; Methods, Eligibility criteria; Supplementary Table 4.                                                                                        |
| <b>METHODS</b>                    |      |                                                                                                                                                                                                                                                                           |                                                                                                                                                                             |
| Protocol and registration         | 5    | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.                                                                            | Methods, opening paragraph. Prospectively registered on OSF, 3 November 2025 ( <a href="https://osf.io/63mpb">https://osf.io/63mpb</a> ). Amendments logged on OSF project. |
| Eligibility criteria              | 6    | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.                                                                                                      | Methods, Eligibility criteria; Supplementary Table 4.                                                                                                                       |
| Information sources*              | 7    | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.                                                                 | Methods, Search strategy; Supplementary Table 3. Author contact reported in Methods, Study selection.                                                                       |
| Search                            | 8    | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.                                                                                                                                           | Methods, Search strategy; Supplementary Table 3.                                                                                                                            |
| Selection of sources of evidence† | 9    | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.                                                                                                                                                     | Methods, Study selection; Fig. 1.                                                                                                                                           |

| SECTION                                               | ITEM | PRISMA-ScR CHECKLIST ITEM                                                                                                                                                                                                                                                                                  | REPORTED ON PAGE #                                                                                                                                                                                                                |
|-------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data charting process†                                | 10   | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | Methods, Data extraction. Charting by one reviewer with independent verification of a random 10% subset, departing from the registered plan of duplicate extraction; deviation and rationale stated in Methods and logged on OSF. |
| Data items                                            | 11   | List and define all variables for which data were sought and any assumptions and simplifications made.                                                                                                                                                                                                     | Methods, Data extraction; Supplementary Data 1, sheet 10 (full codebook and verified dataset). Coding rules and assumptions in Methods, Data extraction, and Unit of analysis and model classification.                           |
| Critical appraisal of individual sources of evidence§ | 12   | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).                                                                                                      | Methods, Critical appraisal. Not conducted, consistent with PRISMA-ScR and JBI guidance; rationale given.                                                                                                                         |
| Synthesis of results                                  | 13   | Describe the methods of handling and summarizing the data that were charted.                                                                                                                                                                                                                               | Methods, Analytical frameworks, and Data synthesis and statistical analysis; Supplementary Data 1, sheets 13 and 14.                                                                                                              |
| <b>RESULTS</b>                                        |      |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                   |
| Selection of sources of evidence                      | 14   | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.                                                                                                                               | Results, Screening and included studies; Fig. 1.                                                                                                                                                                                  |
| Characteristics of sources of evidence                | 15   | For each source of evidence, present characteristics for which data were charted and provide the citations.                                                                                                                                                                                                | Results, Descriptive overview; Table 1; Supplementary Data 1, sheet 1.                                                                                                                                                            |
| Critical appraisal within sources of evidence         | 16   | If done, present data on critical appraisal of included sources of evidence (see item 12).                                                                                                                                                                                                                 | Not applicable; no critical appraisal conducted (item 12).                                                                                                                                                                        |
| Results of individual sources of evidence             | 17   | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.                                                                                                                                                                      | Supplementary Data 1, sheets 1 to 9.                                                                                                                                                                                              |
| Synthesis of results                                  | 18   | Summarize and/or present the charting results as they relate to the review questions and objectives.                                                                                                                                                                                                       | Results, all subsections; Tables and Figs                                                                                                                                                                                         |
| <b>DISCUSSION</b>                                     |      |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                   |
| Summary of evidence                                   | 19   | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.                                                                                                            | Discussion, opening paragraphs and practical implications                                                                                                                                                                         |

| SECTION        | ITEM | PRISMA-ScR CHECKLIST ITEM                                                                                                                                                       | REPORTED ON PAGE #                                             |
|----------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Limitations    | 20   | Discuss the limitations of the scoping review process.                                                                                                                          | Discussion, limitations paragraph.                             |
| Conclusions    | 21   | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.                       | Discussion, closing paragraphs and Future research priorities. |
| <b>FUNDING</b> |      |                                                                                                                                                                                 |                                                                |
| Funding        | 22   | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review. | Acknowledgement                                                |

**Supplementary Table 3 | Full database search strategies and records retrieved**

| # | Search String                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Database        | Records |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| 1 | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders") AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent") AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning")                      | MEDLINE         | 581     |
| 2 | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders") AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent") AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning")                      | PsycINFO        | 232     |
| 3 | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders") AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent") AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning")                      | Emcare          | 489     |
| 4 | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders") AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent") AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning")                      | CINAHL Complete | 154     |
| 5 | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders") AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent") AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning")                      | IEEE Xplore     | 761     |
| 6 | ((AB=(("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders") )) AND AB=((perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent") )) AND AB=((chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning")) | Web of Science  | 1,141   |
| 7 | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders") AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent") AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial                                                                                                                                                                                                                                             | Scopus          | 1,817   |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         |              |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------|
|    | intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                         |              |
| 8  | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders")<br>AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent")<br>AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning") | ACM Digital Library                     | 483          |
| 9  | ("mental health" OR depress* OR anxi* OR wellbeing OR "well-being" OR PMAD OR "perinatal mood and anxiety disorders")<br>AND (perinatal OR prenatal OR antenatal OR antepartum OR postnatal OR postpartum OR maternal OR paternal OR mother OR father OR parent OR neonatal OR childbirth OR pregnancy OR "expectant mother" OR "expectant father" OR couple OR dyad* OR partner OR spouse OR coparent OR "co parent")<br>AND (chatbot OR "chat bot" OR "conversational agent" OR bot OR "conversational AI" OR "artificial intelligence" OR "generative AI" OR AI OR "large language model" OR LLM OR "natural language processing" OR "digital assistant" OR "virtual assistant" OR transformer OR GPT OR "dialog system" OR "machine learning") | Cochrane<br>CENTRAL                     | 387          |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Database subtotal</b>                | <b>6,045</b> |
| 10 | AI, conversational agent, chatbot, perinatal, and Mental health                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Manual searching<br>and grey literature | 73           |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Total records<br/>retrieved</b>      | <b>6,118</b> |

**Supplementary Table 4 | Full eligibility criteria by PCC element**

| PCC element                       | Inclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Exclusion                                                                                                                                                                                                                            |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Population                        | Individuals in the perinatal period (pregnancy to 12 months postpartum): pregnant people, mothers, fathers, non-birthing partners, dyads and couples. No restriction on age, ethnicity or geography.                                                                                                                                                                                                                                                                                                                                      | Non-perinatal populations, or perinatal data not reported separately from a mixed sample.                                                                                                                                            |
| Concept                           | AI-supported conversational agents (chatbots, voice, text or multimodal dialogue systems) for perinatal mental health, using rule-based, retrieval-based, classical machine-learning, LLM or hybrid approaches. Reports on system design, architecture, development, evaluation, ethics, or privacy. Must support interactive natural-language dialogue.                                                                                                                                                                                  | Non-conversational AI (image recognition, diagnostic classifiers without dialogue); static screening tools or non-interactive applications; obstetric or physiological monitoring with no mental-health or conversational component. |
| Context                           | Clinical, real-world, applied or development settings, evaluated with human participants, simulated interactions, datasets, or expert review. Targets perinatal mental health outcomes (depression, anxiety, stress, wellbeing) or user- or system-level outcomes (usability, engagement, feasibility, acceptability, computational performance, architecture, ethics and privacy).                                                                                                                                                       | Systems for pregnancy tracking or general health with no explicit mental health component.                                                                                                                                           |
| Study design                      | Empirical primary studies with original contributions: randomised controlled trials, quasi-experimental, observational, pilot and feasibility, implementation, human–computer interaction, simulation and technical evaluations, and protocol papers with substantive methodological content. Quantitative, qualitative, or mixed methods. Peer-reviewed journal articles and full conference papers. Evaluations without human participants were eligible where they reported technical, architectural, or governance-relevant outcomes. | Reviews, commentaries, editorials and opinion pieces; registered protocols without methodological content or results; non-peer-reviewed outputs (blogs, unreviewed preprints, commercial white papers).                              |
| Timeframe, language, availability | January 2015 to September 2025; English; full text available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Published before 2015; non-English; abstract-only, posters or inaccessible full text.                                                                                                                                                |

## Supplementary Data 1 | Extraction dataset, Governance Maturity Score, and statistical analyses.

Provided as a separate Excel workbook. Study-level sheets cover the 35 included studies and system-level sheets the 30 unique systems (Methods).

| Sheet | Worksheet          | Contents                                                                                                                                                                                                                                                                                                                               |
|-------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Study_Index        | Index and characteristics of the 35 included studies (30 unique systems): system, first author, year, venue, development and evaluation countries, income setting, study design, translational stage, sample, development team, clinician involvement, and model class under the response-generation rule with reclassification notes. |
| 2     | Architecture       | Model class and computational architecture per unique system (n = 30): core model, retrieval-augmented generation, third-party API dependency, deployment architecture, inference location, computational complexity, and code availability.                                                                                           |
| 3     | Privacy_Governance | Privacy-preserving techniques and data governance per study: data storage location, data sovereignty, retention, consent mechanism, audit and logging, regulatory framework referenced, and bias or fairness assessment.                                                                                                               |
| 4     | Population         | Population and representation per unique system: target population, father inclusion, dyadic modelling, system language(s), cultural adaptation, accessibility features, offline capability, perinatal stage, and mental-health target.                                                                                                |
| 5     | Risk_Crisis        | Risk exposure, highest crisis-escalation tier, clinical supervision, in-chat safety disclaimer, automated risk detection, and AI-identity disclosure per study, with notes on general-health referral pathways.                                                                                                                        |
| 6     | GMS_Scores         | Governance Maturity Score (GMS) dimension scores (0–4), totals (0–24), and categories per study, with dimension means and counts and medians by model class.                                                                                                                                                                           |
| 7     | GMS_Evidence       | GMS scoring grid giving the evidence extracted from each study to support each dimension score.                                                                                                                                                                                                                                        |
| 8     | Gov_by_Model_Class | Governance indicators reported by model class (source data for Fig. 7).                                                                                                                                                                                                                                                                |
| 9     | Evaluation         | Evaluation context, evaluation focus, use of validated clinical scales, and real-world clinical outcomes per study.                                                                                                                                                                                                                    |
| 10    | Codebook_Dataset   | Full data extraction codebook and verified dataset; column headers give each variable and its coding options.                                                                                                                                                                                                                          |
| 11    | GMS_Double_Scoring | Independent second-reviewer GMS scoring of 12 randomly selected studies.                                                                                                                                                                                                                                                               |
| 12    | GMS_Consensus      | Dimension-level differences between reviewers and their consensus resolution.                                                                                                                                                                                                                                                          |