BMC Psychiatry

STUDY PROTOCOL

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Transdiagnostic internet cognitive behavioural therapy for anxiety and depressive symptoms in postnatal women: protocol of a randomized controlled trial

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Abstract

Background Nearly 20% of women will be confronted with anxiety or depressive disorders during the perinatal period and this may lead to adverse outcomes for both mother and child. Cognitive behavioural therapy (CBT) is the psychological intervention with the most empirical support for the clinical management of anxiety and depressive disorders. Anxiety and depression frequently occur in women during the perinatal period, and there is growing evidence that internet-delivered CBT (iCBT) could be an acceptable and effective intervention. THIS WAY UP, an Australian digital mental health service, has developed a program for postnatal anxiety and depression. This study protocol aims to examine the acceptability and efficacy of a French-Canadian adaptation of the program.

Methods/design The research team propose to conduct a mixed hybrid type 1 pragmatic randomized clinical trial and implementation study to replicate the findings of the trial conducted in Australia by Loughnan et al. (2019), as well as explore barriers and facilitators to potential large-scale implementation.

Treatment and control conditions a) postnatal anxiety and depression iCBT program with three lessons to complete in a six-week period, added to treatment-as-usual (TAU); b) TAU. Participants will include French-speaking women with probable postnatal depression or anxiety as per the Generalized Anxiety Disorder-7 (GAD-7) or the Edinburgh Postnatal Depression Scale (EPDS). The primary outcome measures will be the GAD-7 and the EPDS. Secondary outcome measures will comprise self-reported instruments to evaluate psychological distress, quality of life, mother–child experience, and treatment experience. Qualitative interviews with participants and health professionals will provide insights on acceptability and delivery of the iCBT program.

Statistical analysis Statistical analysis will follow intent-to-treat principles. A mixed model regression approach will be used to account for between- and within-subject variations in the analysis of the effects of iCBT compared to TAU only intervention.

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Discussion The study will generate important data of efficacy and acceptability to patients, clinicians, and decision-makers to inform the scaling-up of the postnatal iCBT intervention in Canada.

Trial registration ClinicalTrials.gov: NCT06778096, prospectively registered on 2025/01/16.

Keywords Anxiety disorders, Depressive disorders, Postnatal, Non-guided internet cognitive behavioural therapy (iCBT), Pragmatic trial, Web-based intervention, Transdiagnostic

Background

Background and rationale

One in five women will experience anxiety and/or depressive disorders in the antenatal and postnatal periods, with significant anxiety-depression comorbidity [1–3]. When left undetected and untreated, the impacts of anxiety and depression on the mother and infant can be extensive and lasting [4]. Mothers experience substantial psychological distress and impairment in domains such as family and vocational functioning, quality of life and self-care [5, 6]. Maternal anxiety and depression also impact the mother-infant relationship [7]. Children are at greater risk of developing emotional, cognitive and motor difficulties, with developmental outcomes persisting during childhood and adolescence [8, 9]. Therefore, the optimal management of anxiety and depressive symptoms in the perinatal period could considerably improve the well-being of the mother and the infant.

Clinical practice guidelines generally recommend facilitated self-help based on cognitive behavioural therapy (CBT) for subthreshold to mild anxiety and depressive symptoms, and high-intensity evidence-based CBT or interpersonal psychotherapy, and/or medication with careful consideration of risks and benefits for moderate to severe symptoms [10–13]. The Society of Obstetricians and Gynaecologists of Canada (2024) [14] emphasizes the importance to consider the severity of the mental disorder, willingness to engage in treatment, as well as available resources. They recommend that providers offer psychoeducation and information on self-help, including self-guided therapy. For the psychological management of mild to moderate anxiety and depression, particularly with evidence-based CBT or interpersonal therapy, they stress challenges in access to psychotherapy in Canada as well as patients' preference for psychotherapy over pharmacotherapy during the perinatal period [14]. If warranted, initiation of a medication is recommended in conjunction with counselling or psychotherapy, or as a second-line treatment in the case of insufficient improvement in symptoms. Shared decision making is critical and complex during the perinatal period [15–17].

The psychotherapy with the most empirical support is CBT, which is a structured, time-limited psychotherapy that provides proven strategies to challenge negative automatic thoughts and beliefs and implement behavioural changes. Specific studies of CBT conducted in the perinatal population have shown positive results for anxiety and depression [18–20]. In recent years, innovative low-intensity population-based approaches have emerged to overcome challenges in access to high-intensity CBT with a trained psychotherapist [21–23]. Low-intensity psychological interventions are increasingly integrated in care pathways for anxiety and depressive disorders and are often characterized by participation of non-specialist mental health providers, reduced or no provider input, highly focused content and rapid access to self-help material based on CBT principles [21, 24]. Low-intensity CBT can be delivered in various settings and formats, ranging from self-help books to digital therapies [21]. Systematic reviews on the effects of digital CBT in the perinatal period have shown that it can significantly reduce stress, anxiety and depressive symptoms with small to medium effect sizes [25–28]. However, studies were typically underpowered and were limited by significant heterogeneity in outcome measures.

THIS WAY UP, an Australian digital mental health service, has developed an innovative transdiagnostic internet-delivered CBT (iCBT) perinatal intervention for anxiety and depression, comprising two separate, three-lesson prenatal and postnatal programs. To assess the postnatal program, Loughnan et al. (2019) conducted a randomized controlled trial which demonstrated that compared to TAU, the intervention was associated with a reduction in symptoms of depression, anxiety and psychological distress [29]. The effect sizes were large, and progress was maintained one month after the end of the treatment. As for treatment adherence, 75% of those in the iCBT condition completed all three lessons. Mahoney et al. (2023) also conducted a routine care study of the postnatal program ($n=973$) that showed moderate intra-group effect sizes for symptoms of anxiety, depression, and psychological distress, and 42% of women completed all three lessons [30]. The iCBT intervention shows great potential for implementation in Canada as a low-intensity digital CBT that could address barriers to evidence-based psychotherapy in our healthcare context and improve clinical outcomes for women experiencing anxiety and depression in the postnatal period. Furthermore, considering anxiety-depression comorbidity, the transdiagnostic format appears advantageous as it focuses

simultaneously on cognitive and behavioural processes (e.g., avoidance behaviour) and intervention strategies (e.g., exposure, cognitive restructuring) shared among anxiety and depressive disorders [31].

Objectives

The goal of this study is to examine the clinical effectiveness and potential for large scale implementation of a culturally adapted French-Canadian version of the postnatal anxiety and depression iCBT program developed by THIS WAY UP in Australia. The principal aim of the trial is to examine the efficacy of the postnatal anxiety and depression iCBT program, as an add-on to TAU, to reduce symptoms of anxiety and depression during the postpartum period. It is hypothesized that the iCBT postnatal program will be more effective than TAU alone, showing the superiority of the iCBT intervention over TAU alone. Secondary clinical questions will also examine uptake and adherence, psychological distress, maternal quality of life, mother–infant bonding, treatment moderators, and maintenance of gains at follow-up. The secondary aim of the study is to examine the potential for implementation of the iCBT program by examining barriers and facilitators in the acceptability and implementation of iCBT across healthcare providers and patients.

Trial design

The study design is a mixed hybrid type 1 effectiveness-implementation study [32]. The clinical trial is a two-arm parallel group multicentre pragmatic superiority randomized controlled trial (RCT), with allocation at the level of the individual. The RCT is a replication [33] of the original postnatal anxiety and depression iCBT program clinical trial conducted in Australia [29, 34]. The proposed trial is congruent with CONSORT recommendations for RCTs [35] and nonpharmacological treatments [36]. The postnatal iCBT program will be offered to participants in the TAU condition at the end of the 10-week follow up assessment (i.e., delayed intervention). The evaluation of iCBT potential for large-scale implementation will be conducted with an embedded qualitative study with patients and healthcare providers [37, 38].

Methods

Participants

Study setting

The trial will be conducted in two provinces in Canada to provide valuable knowledge that will also inform the potential generalizability of the postnatal iCBT program in community-based care. In Quebec, a French-majority province, recruitment will be conducted in four administrative health regions (i.e., Montérégie-Centre, Montérégie-Est, Montérégie-Ouest, Estrie-Centre Hospitalier Universitaire de Sherbrooke). Overall, the administrative region of Montérégie represents an urban and semi-urban population of nearly 1.5 million inhabitants, with around 14,000 births each year. The administrative region of Estrie represents an urban and semi-urban population of over 500,000 inhabitants with around 4,000 births annually. In Ontario, a French-minority province, the Champlain local health integration network serves over 1.3 million inhabitants, with the Family Birthing Center at Montfort Hospital assisting 3,000 births annually.

Recruitment

This RCT focuses on broad inclusion criteria and minimal exclusion criteria as the intervention was developed for a diverse population of women experiencing anxiety and depressive symptoms in the postpartum period. Inclusion criteria: (1) aged 18 and over; (2) being within 12 months postpartum; (3) fluent in spoken and written French; (4) self-reported clinical score ≥ 10 for anxiety and/ or depressive symptoms based on the *Generalised Anxiety Disorder* (GAD-7) [39] and the *Edinburgh Postnatal Depression Scale* (EPDS) [40]; (5) access to a computer/tablet and Internet connection; (6) agreement to share primary provider contact information. Exclusion criteria: (1) self-reported diagnosis of schizophrenia or bipolar disorder; (2) self-reported substance abuse or dependence; (3) current use of benzodiazepines, (4) recently began psychological therapy (<4 weeks ago) or medication (<8 weeks ago) for depression or anxiety symptoms; (5) very severe depression (EPDS score ≥ 23) or active thoughts of self-harm (EPDS item $10=3$).

Recruitment strategies will include self-referral following advertisements (e.g., clinics waiting rooms, bulletin boards, community organizations, geolocated online advertising and social media), and referrals from clinicians (e.g., family physician, midwife, obstetrician, gynaecologist, nurse practitioner, support group). In addition, the research team will reach out to healthcare organizations with clinical activities addressing the needs of new mothers and infants. Potential participants will consult a website (http://proberge.recherche.usherbrooke.ca) for information about the trial. Access to a computer and internet is a prerequisite for participation in the study. From the website, they will be redirected to the Research Electronic Data Capture (REDCap) platform [41] to complete an initial electronic informed consent, as well as a sociodemographic, clinical, service utilization and medication screening questionnaire. Non-eligible individuals at the screening stage will be provided with an automatic message indicating the motive for exclusion and a suggestion to discuss their symptoms with a healthcare provider, supported by a list of mental health resources. For those excluded specifically due to the criterion of active

thoughts of self-harm (EPDS item 10 = 3), a message will appear directly on the screen to strongly advise seeking urgent care (e.g., emergency phone number, suicide line, emergency room, crisis center), if needed. The message will also emphasize that the research team is not equipped to manage emergency situations.

Eligible participants at the screening stage will be invited to schedule, with an automatic booking application, a brief interview on a secure videoconferencing platform with a trained research professional. At the beginning of the interview, a selective risk assessment will be conducted for women that reported an occasional risk of self-harm at screening (i.e., EPDS item 10 = 1 or 2) with two possible outcomes: a) inclusion into the study; b) exclusion and recommendation to seek appropriate mental health care (e.g., family physician, psychotherapy, emergency room, crisis center). In case of emergency, the research professional will directly contact a provincial suicide line as per the risk management research protocol.

For eligible participants, the research professional will then proceed with the verbal informed consent procedure and enrolment for the clinical trial. Following an additional interview-based data collection (e.g., designated healthcare provider, obstetrical history, further information on service utilization and medication), enrolled participants will be randomly assigned to the study arms. The research professional will directly provide information on assignment and invite all participants to complete their registration and log in to the ēquilia platform. However, only participants in the intervention condition will obtain immediate access to the postnatal iCBT program. Participants in the control group will be informed of the delayed access to treatment. Figure 1 shows the study flowchart.

Interventions

Experimental condition: the postnatal anxiety and depression iCBT program

The perinatal anxiety and depression iCBT programs were developed for THIS WAY UP, a not-for-profit provider of iCBT programs and an initiative of St Vincent's Hospital (Sydney, Australia) and the University of New South Wales (see thiswayup.org.au). The perinatal programs include two courses specifically designed for the pregnancy and postpartum periods. The postnatal program comprises three self-directed lessons for women in the 12 months following birth and focuses on the specific challenges experienced in the postnatal period (e.g., traumatic birth experience, coping with motherhood). The overarching goal of this stand-alone program is to introduce women to CBT skills to help manage symptoms of anxiety and depression, including psychoeducation about the nature and maintenance of anxiety and depression; skills to address somatic symptoms (i.e., controlled breathing, progressive muscle relaxation); cognitive restructuring and structured problem-solving; behavioural activation; graded exposure and assertive

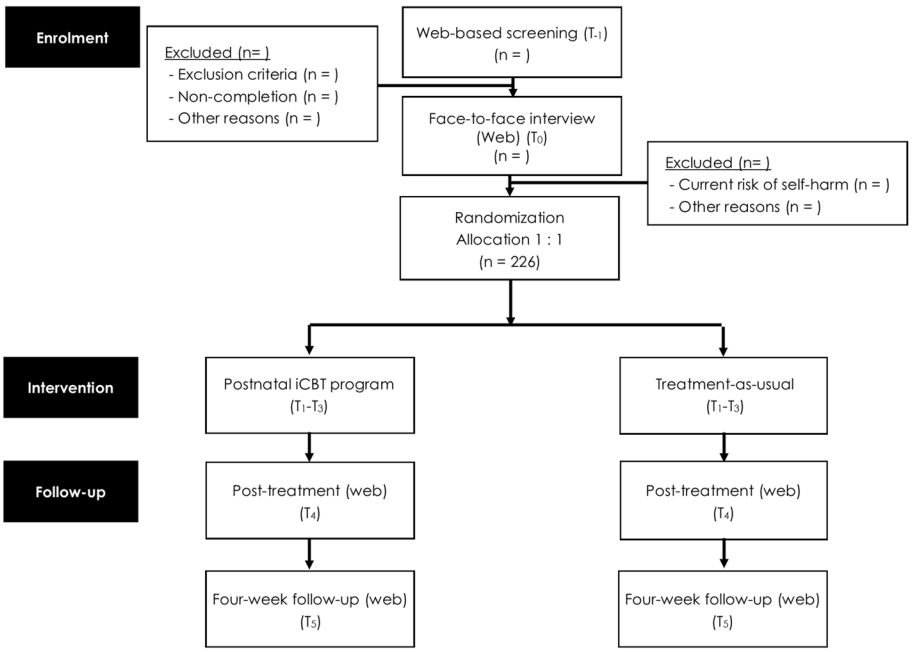

Fig. 1 Flow of participants

communication; and relapse prevention. The lessons are presented using an illustrated, narrative storyline of fictional characters who experience symptoms of low mood and anxiety in the postnatal period. Each lesson is accompanied by practical homework and resources (e.g., medication during breastfeeding, attachment and bonding, information for relatives, sleep, self-care, intrusive thoughts, coping with uncertainty), and is built to be easily generalizable to a broad range of women. Detailed program content and evidence supporting efficacy and effectiveness has been provided previously [29, 30].

The three lessons must be completed within a six-week period, with up to two weeks to complete each lesson. There is a 5-day lapse between lessons to allow for revision, reflection and practice, supported with automated email and text message reminders when the next lesson is available. Three weeks after enrolment in the program, a research professional will also contact each participant with a personalized email to follow-up on their progression and answer any questions they might have about the program.

For this research project, the postnatal iCBT program was translated into French and culturally adapted for Canada. The program will be hosted on the ēquilia platform at Université de Sherbrooke on a secure health informatics technology platform. The platform is available through a technology transfer licence.

Treatment-as-usual

No restrictions will be imposed regarding usual care, as to evaluate the effect of adding the postnatal iCBT program to real-world service use. Enrolled participants will not be constrained to a prespecified usual care treatment or limited in their contacts with the healthcare system. All participants will be informed about the iCBT intervention and the goal of the study of "helping them manage their anxiety and depressive symptoms". Participants in the TAU condition will have a delayed access to the program upon completion of the 10-week assessment period.

Risk management for both conditions

The iCBT intervention will be offered as an add-on to TAU. Healthcare providers designated by each of the participants at baseline will be informed of study participation and treatment assignment. During the iCBT program, psychological distress will be monitored with the *Kessler-10 psychological distress scale* (K10) [42] at the beginning of each lesson. During the study assessment periods, self-harm ideations will be monitored with the EPDS [40]. Healthcare providers will be notified within 24 hours during working days in case of elevated psychological distress (i.e., with the K-10, total score $\geq$ 30) or active self-harm ideations (i.e., item 10 of EPDS = 2 or 3). Participants will also be notified by automatic email in case of elevated distress or self-harm risk, with recommendations to seek care and suggested resources.

Participant assessment

Table 1 shows the assessment timeline. Sociodemographic data will comprise age, gender, marital status, racial identity, ethnicity, education level, nationality, income level, and occupation. Previous diagnosis of mental disorders diagnosed by a healthcare professional (i.e., substance abuse or dependency, schizophrenia, bipolar disorder) will also be self-reported. Data will also be collected on obstetrical history (e.g., number of months since delivery, previous pregnancies, high risk pregnancy, difficult birth experience). Clinical data will comprise brief instruments with good psychometric properties that have been previously used in transdiagnostic and diagnostic-specific interventions for anxiety and depressive disorders in the general population as well as in perinatal women to facilitate comparability [26, 28, 43].

Primary outcome measures

The severity of anxiety symptoms will be assessed using the GAD-7 [39], a 7-item self-report questionnaire. Items are scored on a scale between 0 and 3, with a maximum score of 21 interpreted as none/minimal (0–4), mild (5–9), moderate (10–14), or severe (15–21) anxiety severity. A score between 10 and 14 on the GAD-7 has been indicated to consider treatment with CBT in the perinatal period [14]. The EPDS [40] will also be administered, a 10-item self-report questionnaire evaluating the severity of postpartum depressive symptoms. Items are scored on a scale between 0 and 3, with a maximum score of 30. Cut-offs between 10 and 13 have been used to screen for major depression in postpartum women [44].

Secondary outcome measures

Psychological distress will be assessed with the K-10 [42], a widely used 10-item questionnaire intended to yield a global measure of distress based on questions about anxiety and depressive symptoms in the past four weeks. Health-related quality of life will be examined with the *Assessment of Quality of Life—6 dimensions* [45], a 20-item self-administered questionnaire, retrospective over the past week, with six subscales for independent living, mental health, coping, relationships, pain and senses. The *Maternal Postnatal Attachment Scale* [46], a 19-item self-report questionnaire, will be used as a measure of the affective aspect of mother-infant bonding over the past 2 weeks. It comprises three subscales, including absence of hostility, pleasure in interaction and quality of attachment.

Table 1 Study schedule of participant assessment

Timepoint	Web-based screening	Web-based interview / enrolment	Intervention (6 weeks)	Post-treatment	Follow-up
	T_{-1}	T_0	$T_1 T_2 T_3$	T_4	T_5
Sociodemographic and clinical assessment					
Sociodemographic variables	X				
Self-reported mental disorders	X				
Symptom-focused outcomes					
Generalized Anxiety Disorder – 7	X			X	X
Edinburgh Postnatal Depression Scale	X			X	X
Kessler-10 psychological distress scale	X		X X X	X	X
Health-related quality of life					
Assessment of Quality of Life – 6D	X			X	X
Service utilization and medication					
Brief self-report (screening)	X				
Service utilization and psychotropic medication		X		X	X
Mother-infant bonding					
Maternal Postnatal Attachment Scale	X			X	X
Experience with the program					
Client Satisfaction Questionnaire				X	
System Usability Scale				X	

Service utilization

For service utilization data, a brief retrospective questionnaire on mental health consultations and psychotropic medication in the past three months will be administered at baseline, including recently initiated psychotherapy and pharmacotherapy. Mental health consultations and psychotropic medication during the study will also be documented retrospectively at post-treatment and follow-up.

Platform user data

As well as K10 scores at each lesson, engagement data will be collected through the systematic web-tracking of data embedded in the ēquilia platform, including uptake (i.e., beginning the first lesson), adherence (i.e., completing the three lessons), and overall user data (e.g. number of log in, number of days between lessons, time spent on the platform).

Experience with the program

The first questions will address participants' engagement with the program and the reasons for not completing or initiating it (if applicable). Participants who completed at least one lesson will also be asked to provide specific feedback on the postnatal iCBT program through a series of questions on program delivery and lessons. The *Client Satisfaction Questionnaire* (eight-item version) [47] and the *System Usability Scale* [48] will also be administered. The *Client Satisfaction Questionnaire*−8 [47] is a tool for evaluating client's satisfaction with a service. It consists of eight items rated on a 4-point Likert scale. The score varies between 8 and 32, with a higher score indicating greater satisfaction. The *System Usability Scale* [48] measures the user-perceived efficiency of a system, and their satisfaction. It has been modified to assess the ēquilia platform. Ten generic items are rated on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree". This scale has been widely used to evaluate digital health applications [49].

Embedded qualitative interviews

A sequential embedded qualitative approach [50] will be used to be used to gain deeper insights into the barriers and facilitators influencing engagement with the iCBT intervention, as perceived by both participants and healthcare providers. This qualitative phase will enrich our understanding of stakeholder perspectives on the content and delivery of the intervention. Hence, the findings will provide valuable guidance on addressing implementation challenges and optimizing the intervention's integration into real-world settings [51, 52]. The embedded qualitative study will be guided by an acceptability theoretical framework for health interventions [37] and *Expert Recommendations for Implementing Change* [38]. The data collection will include individual face-to-face semi-structured interviews carried out with

approximately 20 participants and 20 healthcare providers, with the final sample sizes being guided by data redundancy [53, 54]. The interviews will be conducted at the end of the follow-up period. For participants, a purposeful maximum variation sampling [50, 55] will be used to reflect different perspectives on the intervention by gender (conditional on gender-diversity), age group, clinical profile and province. The 30-min interviews will be conducted on a web-based secure videoconference system. A semi-structured interview guide [55] will be used to elicit information on six main themes: (1) general experience with iCBT; (2) reasons and motivations regarding treatment participation; (3) acceptability of iCBT; (4) variations in effects; (5) strengths and limitations; (6) environmental support. For healthcare providers, a purposeful maximum variation sampling [50, 55] will be used to reflect different perspectives on the iCBT program by variation on age group, profession and province. The semi-structured interviews will explore similar themes, as well as: (7) barriers and facilitators for implementation in routine care. Data coding and analysis will be conducted by trained raters based on the interactive cyclical process of data reduction, data display, conclusion drawing and verification with a mixed content analysis method, i.e. based on predetermined and emerging categories [56]. Qualitative data will be transcribed, and content analysis [56] will be supported by NVivo.

Data collection, analysis and management

Participant timeline

Data collection will include assessment periods at baseline (T_{-1}, T_0; Week 0), at the beginning of each of the three lessons of the active treatment for the experimental group (T_1, T_2, T_3; from Week 1 to 6), at post-treatment (T_4; Week 6) and at the four-week follow-up (T_5; Week 10). Automated and manual invitations and reminders will be emailed to participants to complete post-treatment and four-week follow-up questionnaires. For the time participants invested in the project, they will be offered a 20 gift card as financial compensation for each follow-up assessment completed.

Data collection will be entirely completed online using the REDCap tools hosted by the health informatics platform at the Centre Hospitalier Universitaire de Sherbrooke research center, except for data collected during the treatment phase on the ēquilia platform. Anonymized data will be stored on a secured and restricted server at the Université de Sherbrooke. Only the nominated principal investigator (PR), the study coordinator and the REDCap research team manager will have access to the nominative data. Research professionals involved in interviews with participants will have limited access to nominative data (email address, name).

Assignment of interventions: sequence generation, allocation concealment mechanism and implementation

Randomization will be at the patient level with a 1:1 ratio. Randomization will be stratified by study site and blocked with randomly selected block sizes (2,4) to ensure a balance in the allocation for the strata and thus eliminate the risk of a secular trend in the composition of groups. Randomization will be carried out using a code generated by an independent statistician. A REDCap module will inform the research professional of assignment based on the allocation sequence after verification of eligibility. Concealment will be maintained for the participants, research team, and staff. The participants and research coordinator will not be blinded to group allocation.

Sample size

Due to challenges in calculations for mixed regression models [57], the sample size was estimated based on the post-treatment between groups differences for the primary outcomes. The sample size was calculated using G*Power based on values reported by Loughnan et al. (2019). To assess significant differences for the two main outcomes, the sample size calculation was based on the results of the GAD-7 as it was the outcome measure with the lowest effect-size in the previous trial [29]. The means (standard deviation) of the GAD-7 at post-treatment were 6.66 (4.23) and 9.97 (4.22) in the iCBT and TAU groups respectively, i.e., an inter-group effect size of 0.78. Considering these values, a sample size of 27 individuals per condition is therefore required to detect a 3.31-point (pooled SD: 4.23) difference between iCBT and TAU, with 80% power and a level of significance of 0.05. The sample size will be adjusted to ensure sufficient power for secondary analyses stratified based on severity of both anxiety (GAD-7) and depressive (EPDS) symptoms at baseline. Based on the initial trial, 30% of participants will have a subclinical score for one of the two disorders, and 90 individuals per condition will be required to maintain a sample size of at least 27 individuals with subclinical scores (EPDS < 10 or GAD-7 < 10) per condition. After accounting for a 20% attrition rate, the proposed final sample size is 113 individuals for each arm.

Statistical analysis plan

The primary outcome analysis will be performed at T_4. The remaining analysis will be conducted considering all measures over time when all participants have completed the four-week follow up (T_0 through T_5) [35]. Statistical analysis will follow intent-to-treat principles [35]. Descriptive analyses and mixed effects regression models will be conducted for patient-level data. Analyses will be conducted at baseline (T_0), during the iCBT program (T_1-T_3), at post-treatment (T_4) and four-week

follow-up (T_5), regardless of adherence. Binary logistic regression will evaluate the missing at random assumption to predict dropout and compare groups (with/without complete data) on baseline measures. Primary question: A mixed model regression approach with the maximum-likelihood method will be used to account for between- and within-subject variations in the analysis of the longitudinal effects of iCBT compared to TAU intervention on the primary outcome measures of anxiety symptoms (GAD-7) and depressive symptoms (EPDS) at post-treatment (T_4). To control intra-group variability, random effects will be added on the participants nested in the study sites. The effects of the intervention will be adjusted for possible covariates (e.g., age, principal anxiety or depressive symptoms). Analyses will be conducted with all available data without imputation, as estimation of parameters by maximum likelihood is considered adequate to address missing data as post-treatment in the multilevel model [58]. Secondary questions: The mixed model regression approach will be repeated on all data at the 4-week follow-up (T_0 through T_5) and will allow for the inclusion of participants with missing data. Similar models will examine secondary outcomes. Moderation analyses will be performed for three sets of moderators, including clinical characteristics, previous treatments and sociodemographic characteristics. Additionally, treatment effect sizes will be calculated with Cohen's *d*. Process-outcomes correlations will be examined for adherence. Sensitivity analyses will be conducted to assess the impact of missing data on estimates of treatment effects with and without imputation, as well as per protocol (i.e., all three lessons completed). Sensitivity analyses will provide valuable data on the robustness of results.

Hypothesis-generating subgroup analyses defined by baseline factors will be performed with the moderation analyses, including anxiety/depression clinical severity and age group. We will also report comprehensive disaggregated outcome data for clinical severity.

Trial coordination

The trial coordinating center will be at Université de Sherbrooke. The Executive committee will be composed of the co-PIs, a co-applicant for each clinical site, and the research coordinator, with web meetings every two weeks throughout the project, an efficient management strategy for multi-centric trials. The research coordinator will act as the primary contact for research professionals and patients. A Steering committee (i.e., co-investigators, collaborators and knowledge users) will meet at strategic decision-making points throughout the trial. An Advisory board will be consulted to ensure that essential research questions are addressed, interpretation of results reflects different voices, and knowledge transfer strategies are optimal to reach target stakeholders (i.e., women in the perinatal period, perinatal healthcare providers, decision-makers).

Monitoring steering committee

The study will be overseen by an independent data and safety monitoring committee consisting of three members with collective expertise in clinical trials, perinatal care, digital mental health, and statistics. The data and safety monitoring committee will oversee the interim monitoring of recruitment, uptake and adherence, and adverse events with audits every three months.

Dissemination policy

We have adopted an integrated knowledge transfer strategy in which knowledge users are integral team members and participate in the complete research process. Members of the interdisciplinary team have strong ties to regional, provincial and national decision makers and will seek to define the optimal strategies for iCBT scaling up following positive results.

Discussion

Clinical trials of iCBT for anxiety and depression in the perinatal period have reported positive results, and suggest that perinatal iCBT is feasible, acceptable and efficacious [26, 28, 59]. However, the field is still at an early stage, and more research is needed before moving from research to practice. There has been a recent call for more replication studies in clinical social sciences [33, 60]. In light of the current state of knowledge for iCBT in postnatal anxiety and depression and the positive results obtained with the Australian trial [29], the conduct of a large-scale randomized controlled trial in collaboration with the development team will aim at replicating the clinical outcomes and to enhance generalizability of findings, with the additional purpose of exploring barriers and facilitators to implementation in the Canadian context. A rigorous evaluation of the efficacy of the postnatal anxiety and depression iCBT program as an add-on to TAU in Canada will help guide decision-makers, managers and clinicians who are entrusted to implement mental health services. With positive results from the trial, our research team will support the widespread implementation of this intervention in Quebec, Ontario and other settings in Canada. The program is well adapted to the reality of new mothers as it is brief and can be promptly and safely completed from home. The large-scale implementation of the postnatal iCBT program in Canada could help alleviate the serious consequences associated with the experience of anxiety and depression for mothers and children.

Abbreviations

CBT	Cognitive Behavioural Therapy
EPDS	Edinburgh Postnatal Depression Scale
GAD-7	Generalized Anxiety Disorder-7
iCBT	Internet-delivered CBT
K10	Kessler-10 psychological distress scale
REDCap	Research Electronic Data Capture
TAU	Treatment-as-usual

Authors' contributions

PR: Conceptualization, Funding acquisition, Methodology, Writing – Original Draft, Writing – Review & Editing. HMV, MCBe, MHC, ACu, MD, CD, AG, JG, CH, DK, RL, AM, MDP: Conceptualization, Funding acquisition, Methodology, Writing – Review & Editing. MCBa, DG, IH, AL, MTL, SC: Conceptualization, Methodology, Writing – Review & Editing. ACh: Methodology, Writing – Original Draft, Writing – Review & Editing. All authors read and approved the final manuscript.

Funding

The Canadian Institutes of Health Research funded this study (grant # 178144). They had no role in the design of this study and will not have any role during its execution, analyses, interpretation of the data, or decision to submit results.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The protocol was approved by the ethics review boards of all study sites in Quebec, namely the Centre intégré universitaire de santé et de services sociaux de l'Estrie – Centre hospitalier universitaire de Sherbrooke (#MP-31–2024-5238; November 29th, 2023), the Centre intégré de santé et de services sociaux de la Montérégie-Est (#MP-31–2024-5238; March 27th, 2024), the Centre intégré de santé et de services sociaux de la Montérégie-Ouest (#RP-2023–12; October 30th, 2024) and the Centre intégré de santé et de services sociaux de la Montérégie-Centre (#MEO-31–2024-849; December 19th, 2024). For all phases of the study, written or verbal consent will be obtained. Ethics approval for Ontario to follow at a later date.

Consent for publication

Not applicable.

Competing interests

HMV is on the editorial board of BMC Psychiatry.

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Received: 4 February 2025 Accepted: 20 February 2025
Published online: 13 March 2025

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