Postpartum Depression Prevention

Feasibility and Effectiveness of 1-Day Online Cognitive Behavioral Therapy-Based Workshops for the Prevention of Postpartum Depression

By Zoe Boland

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TITLE: Feasibility and Effectiveness of 1-Day Online Cognitive Behavioral Therapy-Based Workshops for the Prevention of Postpartum Depression

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Lay Abstract

Postpartum depression is an ideal disorder for prevention due to its high prevalence, clear window for intervention (pregnancy), and easily identifiable risk factors. The objective of this thesis was to determine whether an online 1-day CBT-based workshop, was feasible for participants and whether it was effective in preventing PPD. In the first study the ability to design a 1-day intervention, as well as the feasibility of its study design, recruitment and retention strategies on participants were assessed. In the second study its effectiveness at preventing PPD was examined. We found that our 1-day workshop was feasible for participants and showed promise in preventing PPD in higher-risk samples. This research can provide guidance for future preventive interventions to improve outcomes for birthing parents at risk of developing PPD.

Abstract

Objectives: To assess the feasibility and effectiveness of an online 1-day cognitive behavioural therapy (CBT)-based workshop in the prevention of postpartum depression (PPD)

Methods: In Study 1, data was analyzed from a cohort of 38 birthing parents in the form of a pre-test-post-test pilot study. The ability to develop a 1-day prevention intervention, with feasible study design, recruitment, and retainment strategies that was acceptable to participants was assessed and effect sizes were preliminarily measured in preparation to develop a future full-scale randomized control trial (RCT). In Study 2, a parallel-group RCT was utilized to examine a new group of 124 participants split into either the experimental or control group. Participants received the workshop plus treatment as usual (TAU; experimental group) or TAU alone (control), Major depressive disorder (MDD) diagnosis, levels of PPD symptoms, anxiety, social support, mother-infant relationship quality, and infant temperament was assessed at one, two, and three months postpartum.

Results: In Study 1, a 1-day prevention intervention for PPD that was deemed acceptable to study participants was successfully developed. The online 1-day CBT-based workshops for preventing PPD were feasible in terms of study design based on participant recruitment speed and retention rate. In Study 2, trial recruitment was stopped after 25% of the expected sample size was recruited as fewer than 10% of participants in either group developed MDD at three months postpartum. Data were collected up to three months postpartum in those already enrolled. Among all enrolled participants (n=124), a trend toward larger reductions in EPDS scores was seen in the experimental group at two months postpartum ($p=0.06$). Participants with baseline Edinburgh Postnatal Depression Scale Score ≥ 7 in the experimental group showed larger, statistically significant reductions in PPD and anxiety at two months postpartum.

Conclusion: The studies in this thesis suggest that the 1-day online CBT-based workshop could have potential as an intervention for preventing PPD in birthing parents considered higher-risk.

Keywords: Postpartum depression, pregnancy, perinatal care, prevention and control, cognitive behavioural therapy, mental disorders

Acknowledgements

As my final year as a graduate student comes to its conclusion, I take the time to reflect upon the bounty of experiences I've had over the past two years. I will look back fondly on this period of my life, with its ups and downs, my accomplishments, the lessons I've learned, the connections I've made and the people I've met.

I would like to start by thanking my parents, Évelyne and Philip, for their unending support throughout my graduate experience. They have always stood in my corner and I am grateful for their encouragement, constantly pushing me to better myself and to have faith in my own abilities.

I would like to thank Dr. Ryan Van Lieshout for taking me under his wing as a graduate student undertaking one of his many projects. Through his admirable work ethic, leadership and discipline I strove to improve myself and elevate my work to higher than I could imagine. I am grateful for his faith in my skills as a member of his lab and as a researcher. I would also like to thank Nancy Lloyd for her help with my thesis work: her countless hours and dedication to this project made it possible. I would like to thank my committee members, Dr. Luciano Minuzzi and Dr. Khrista Boylan for their support and feedback on my thesis during my graduate studies.

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List of Abbreviations

ANRQ: Antenatal Risk Questionnaire

CAD: Canadian Dollar

CBT: Cognitive Behavioural Therapy

CI: Confidence Interval

CSQ-8: Client Satisfaction Questionnaire-8 Item Scale

EPDS: Edinburgh Postnatal Depressive Scale

GAD: Generalized Anxiety Disorder

GAD-7: Generalized Anxiety Disorder-7 Item Scale

GEE: Generalized Estimating Equation

IBQ: Infant Behaviour Questionnaire

IBQ-R-EC: Infant Behaviour Questionnaire-Revised Emotional Control Subscale

IBQ-R-NA: Infant Behaviour Questionnaire-Revised Negative Emotionality Subscale

IBQ-R-SUR: Infant Behaviour Questionnaire-Revised Surgency Subscale

IBQ-R-VSF: Infant Behaviour Questionnaire-Revised Very Short Form

MDD: Major Depressive Disorder

MINI: Mini International Neuropsychiatric Interview

MSPSS: Multidimensional Scale of Perceived Social Support

PBQ: Postpartum Bonding Questionnaire

PPD: Postpartum Depression

PSS: Perceived Stress Scale

RCT: Randomized Control Trial

REDCap: Research Electronic Data Capture

REML: Restricted Maximum Likelihood

SD: Standard Deviation

TAU: Treatment As Usual

USPSTF: United States Prevention Services Task Force

Declaration of Academic Achievement

I drafted the initial versions of the manuscripts for both studies and collaborated with co-authors to finalize them for inclusion in this sandwich thesis. My contributions and those of my coauthors are described below.

Study 1: I aided in participant recruitment, collected participant data, conducted data analyses and wrote the initial manuscript. Dr. Ryan Van Lieshout contributed to the study's conceptualization, delivered the intervention to participants, provided guidance on data interpretation, and offered critical feedback on the final manuscript. Nancy Lloyd aided in participant recruitment, collected participant data and offered critical feedback on the final manuscript. Haley Layton aided in conducting data analysis and offered critical feedback on the final manuscript.

Study 2: I aided in participant recruitment, collected participant data, aided in conducting data analyses and wrote the initial manuscript. Dr. Ryan Van Lieshout contributed to the study's conception, guided data interpretation, and provided critical feedback on the final manuscript. Nancy Lloyd aided in participant recruitment, data collection and offered critical feedback on the final manuscript. Jesus Serrano Lomelin supported data analyses.

Chapter 1. Background

1. Postpartum Depression

Postpartum depression (PPD) is defined as a depressive episode occurring within the 12 months after childbirth, with onset of symptoms occurring within 4 weeks of delivery (O'Hara, 2009; US Preventive Services Task Force, 2019). With up to 1 in 5 birthing parents developing PPD, it is one of the most common complications post-childbirth (Gavin et al., 2005; Moore Simas et al., 2019). The symptoms of PPD overall align with those of major depressive disorder (MDD), which include a depressed mood, fatigue, loss of interest or pleasure, feelings of worthlessness and guilt, agitation and suicidal ideation (American Psychiatric Association, 2022). Risk factors that increase the likelihood of birthing parents developing PPD include a history of depression, current depressive symptoms, a history of physical or sexual abuse, current stressful life events, and a lack of social or financial support (US Preventive Services Task Force, 2019). When left untreated, PPD can lead to relationship difficulties and have short and long-term effects on both the birthing parent and the child, with increased risks of cognitive, behavioural and emotional problems in offspring (Gavin et al., 2005; Moore Simas et al., 2019) for example. The lifetime cost of PPD is estimated to be up to $150,000 CAD per birth over the lifespan (Bauer et al., 2014).

2. Prevention

2.1 The History of Prevention

Preventive health practices have been commonplace throughout history, with the first put in place to curve the spread of infectious diseases. Historically, preventive interventions have been categorized in three ways: on an individual level through personal hygiene and proper diet; larger-scale social interventions designed to protect groups of individuals (for example, through

social isolation or quarantine); and broader applications of increased biomedical and epidemiological knowledge (Becker, 1988).

2.2. Types of Prevention

There are also three main types of preventive interventions (Baumann & Ylinen, 2017; Kisling & Das, 2024). Primary prevention involves measures taken by healthy individuals to prevent a health issue or concern from developing, as well as increasing the immunity of those at risk of developing health problems (e.g., immunization). Secondary prevention entails early detection and intervention in order to control a health problem within an individual and minimize its effects. These interventions target individuals with subclinical levels of symptoms, most often detected through health screenings (e.g., Papanicolaou (pap) smears used to diagnose cervical cancer prior to its progression). Tertiary prevention is implemented in patients who are already in the clinical and outcome stages of a disease, with the aim of reducing the severity and any further complications related to the health concern. Tertiary prevention therefore frequently takes the form of treatment and rehabilitative efforts.

2.3. Mental Health Prevention

In recent years there has been an increase in the field of mental health prevention as an awareness of the negative impacts of poor mental health has become more prevalent (Singh et al., 2022). Mental disorders pose a large socioeconomic burden on not just the scale of the individual, but on communities, and healthcare systems (Jenkins et al., 2011). Mental health is a prime target for prevention due to its high economic impact, low number of effective treatments and its potential for intergenerational transmission (particularly in the perinatal period) (Waechter et al., 2023), with prevention guidelines being developed on national (such as the United States Prevention Services Task Force (USPSTF), United States Center for Disease

Control and Prevention, etc.) and global scales (Prevention of Mental Disorders, 2004). In spite of this, preventive interventions and mental health promotion have received relatively little attention in comparison to psychopathology research on treatment (Singh et al., 2022).

2.4 Postpartum Depression Prevention

PPD is underdiagnosed and undertreated, with as few as 10% of birthing parents with PPD receiving evidence-based care (Bowen et al., 2012). These factors make PPD ideal for prevention, due to its high prevalence, clear window for intervention, identifiable risk factors and potential impact on both birthing parent and child. Significant barriers to treatment also exist. Birthing parents reluctant to take medication out of concern for the adverse effects (Cipriani et al., 2007) and current psychotherapeutic interventions require participants to attend 8-10 weekly sessions (US Preventive Services Task Force, 2019), which may be neither time nor cost-effective, particularly for working parents or parents with other children.

According to the USPSTF, there have been numerous preventive interventions proposed for PPD (O'Connor et al., 2019; US Preventive Services Task Force, 2019). However, among the research published and analysed, there have not been any commonly agreed upon prevention methods, resulting in a substantial variation in clinical practice. There are currently no clinical guidelines for PPD prevention published and no prior USPSTF recommendation until the publication of their evidence report and systematic report in 2019. Despite the risk factors for PPD being well established and with cursory knowledge of potential interventions that may help prevent PPD, the effectiveness of the interventions needs to be more comprehensively evaluated.

3. Objectives of the Present Thesis

With the current gaps in PPD prevention literature and the barriers faced by birthing parents seeking care known, novel preventive interventions that are brief, easily accessible, safe

and efficient should be developed. The delivery of brief psychotherapeutic interventions in large groups of up to 30 participants has been a relatively recent phenomenon but shows promise in addressing the needs of at-risk birthing parents as well as helping to prevent PPD on a larger population scale. Large 1-day CBT psychoeducational workshops have previously been used in the United Kingdom to treat depression and generalized anxiety disorder (GAD) in general population samples, proving to have effects lasting up to 2 years post-intervention and being cost-effective (Brown et al., 2008; Horrell et al., 2014). When these workshops were then adapted for treating PPD, they were proven effective when delivered by peers and professionals and when delivered either in-person or online (Babiy et al., 2024; Merza et al., 2023; Van Lieshout et al., 2021, 2023).

This dissertation's objective is to determine if an online 1-day CBT-based PPD prevention workshop added to treatment as usual (TAU) is feasible and effective in preventing PPD compared to TAU alone, while additionally examining its impact on postpartum anxiety, social support, the mother-infant relationship and infant temperament. This thesis addresses the need for brief and novel PPD preventive interventions, given the widespread interest and investment of public health units across Ontario in maternal and child health.

Study 1: Online 1-Day CBT-Based Workshops for Preventing Postpartum Depression

In the first study, we used a pilot study design to determine whether a 1-day prevention intervention could be successfully developed, as well as assessing the feasibility of its study design, recruitment, and retainment strategies, and its acceptability to participants and preliminary estimates of effect as a precursor to a future full-scale randomized control trial (RCT). The study results showed that the 1-day online CBT-based workshop and our study

design seemed to be feasible for participants, taking into consideration our high retention rates, participant recruitment speed and our high levels of participant satisfaction with the workshop.

Study 2: 1-Day Online Cognitive Behavioral Therapy-Based Workshops for the Prevention of Postpartum Depression

In the second study, our goal was to determine whether the online 1-day CBT-based workshop for preventing PPD added to treatment as usual (TAU) was more effective than TAU alone at preventing PPD at three months postpartum, additionally examining its secondary impact on postpartum anxiety, social support, the mother-infant relationship and infant temperament. Since fewer than 10% of participants in either group developed MDD at three months postpartum, trial recruitment was stopped, with the data of already enrolled participants continuing to be collected up to two months postpartum. The study was unable to draw definitive conclusions regarding the effectiveness of the online 1-day CBT workshop due to limited statistical power; however, its results with the smaller sample size show promise for a future full-scale RCT with a higher-risk sample.

Overall, our findings suggest that the online 1-day CBT workshop for preventing PPD is a promising intervention that requires further testing to determine its effectiveness. The first study in this thesis has been published in the Journal of Obstetrics and Gynaecology Canada and the second study is in the process of being prepared for submission.

References

American Psychiatric Association. (2022). *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR).* (5th ed.). https://doi/book/10.1176/appi.books.9780890425787

Babiy, Z., Layton, H., Savoy, C. D., Xie, F., Brown, J. S. L., Bieling, P. J., Streiner, D. L., Ferro, M. A., & Van Lieshout, R. J. (2024). One-Day Peer-Delivered Cognitive Behavioral Therapy-Based Workshops for Postpartum Depression: A Randomized Controlled Trial. *Psychotherapy and Psychosomatics*, *93*(2), 129–140. https://doi.org/10.1159/000536040

Bauer, A., Parsonage, M., Knapp, M., Iemmi, V., & Adelaja, B. (2014). The costs of perinatal mental health problems. *Personal Social Services Research Unit*. http://eprints.lse.ac.uk/59885/1/__lse.ac.uk_storage_LIBRARY_Secondary_libfile_shared_repository_Content_Bauer%2C%20M_Bauer_Costs_perinatal_%20mental_2014_Bauer_Costs_perinatal_mental_2014_author.pdf

Baumann, L., & Ylinen, A. (2017). *Prevention: Primary, Secondary, Tertiary* (pp. 1–3). https://doi.org/10.1007/978-1-4614-6439-6_135-2

Becker, D. M. (1988). History of Preventive Medicine. In D. M. Becker & L. B. Gardner (Eds.), *Prevention in Clinical Practice* (pp. 13–21). Springer US. https://doi.org/10.1007/978-1-4684-5356-0_2

Bowen, A., Bowen, R., Butt, P., Rahman, K., & Muhajarine, N. (2012). Patterns of depression and treatment in pregnant and postpartum women. *Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie*, *57*(3), 161–167. https://doi.org/10.1177/070674371205700305

Brown, J. S. L., Elliott, S. A., Boardman, J., Andiappan, M., Landau, S., & Howay, E. (2008). Can the effects of a 1-day CBT psychoeducational workshop on self-confidence be maintained after 2 years? A naturalistic study. *Depression and Anxiety*, *25*(7), 632–640. https://doi.org/10.1002/da.20365

Cipriani, A., Geddes, J. R., Furukawa, T. A., & Barbui, C. (2007). Metareview on Short-Term Effectiveness and Safety of Antidepressants for Depression: An Evidence-Based Approach to Inform Clinical Practice. *Canadian Journal of Psychiatry*, *52*(9), 553–562.

Gavin, N. I., Gaynes, B. N., Lohr, K. N., Meltzer-Brody, S., Gartlehner, G., & Swinson, T. (2005). Perinatal depression: A systematic review of prevalence and incidence. *Obstetrics and Gynecology*, *106*(5 Pt 1), 1071–1083. https://doi.org/10.1097/01.AOG.0000183597.31630.db

Horrell, L., Goldsmith, K. A., Tylee, A. T., Schmidt, U. H., Murphy, C. L., Bonin, E.-M., Beecham, J., Kelly, J., Raikundalia, S., Brown, J. S. L., & CLASSIC trial group. (2014). One-day cognitive-behavioural therapy self-confidence workshops for people with depression: Randomised controlled trial. *The British Journal of Psychiatry: The Journal of Mental Science*, *204*(3), 222–233. https://doi.org/10.1192/bjp.bp.112.121855

Jenkins, R., Baingana, F., Ahmad, R., McDaid, D., & Atun, R. (2011). Social, economic, human rights and political challenges to global mental health. *Mental Health in Family Medicine*, *8*(2), 87–96.

Kisling, L. A., & Das, J. M. (2024). Prevention Strategies. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK537222/

Merza, D., Layton, H., Savoy, C., Babiy, Z., Campbell, M., Bieling, P. J., Brown, J. S. L., & Van Lieshout, R. J. (2023). Online Peer-Delivered 1-Day Cognitive Behavioral Therapy-

Based Workshops for Postpartum Depression: A Pilot Study. *The Journal of Clinical Psychiatry*, *84*(1), 22br14574. https://doi.org/10.4088/JCP.22br14574

Moore Simas, T. A., Huang, M.-Y., Patton, C., Reinhart, M., Chawla, A. J., Clemson, C., & Eldar-Lissai, A. (2019). The humanistic burden of postpartum depression: A systematic literature review. *Current Medical Research and Opinion*, *35*(3), 383–393. https://doi.org/10.1080/03007995.2018.1552039

O'Connor, E., Senger, C. A., Henninger, M. L., Coppola, E., & Gaynes, B. N. (2019). Interventions to Prevent Perinatal Depression: Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA*, *321*(6), 588–601. https://doi.org/10.1001/jama.2018.20865

O'Hara, M. W. (2009). Postpartum depression: What we know. *Journal of Clinical Psychology*, *65*(12), 1258–1269. https://doi.org/10.1002/jclp.20644

Prevention of mental disorders: Effective interventions and policy options summary report. (2004). [Report]. World Health Organization. https://www.drugsandalcohol.ie/25604/

Singh, V., Kumar, A., & Gupta, S. (2022). Mental Health Prevention and Promotion—A Narrative Review. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.898009

US Preventive Services Task Force. (2019). Interventions to Prevent Perinatal Depression: US Preventive Services Task Force Recommendation Statement. *JAMA*, *321*(6), 580–587. https://doi.org/10.1001/jama.2019.0007

Van Lieshout, R. J., Layton, H., Savoy, C. D., Brown, J. S. L., Ferro, M. A., Streiner, D. L., Bieling, P. J., Feller, A., & Hanna, S. (2021). Effect of Online 1-Day Cognitive Behavioral Therapy–Based Workshops Plus Usual Care vs Usual Care Alone for

Postpartum Depression: A Randomized Clinical Trial. *JAMA Psychiatry*, *78*(11), 1200–1207. https://doi.org/10.1001/jamapsychiatry.2021.2488

Van Lieshout, R. J., Layton, H., Savoy, C. D., Xie, F., Brown, J. S. L., Huh, K., Bieling, P. J., Streiner, D. L., Ferro, M. A., & Haber-Evans, E. (2023). In-person 1-day cognitive behavioral therapy-based workshops for postpartum depression: A randomized controlled trial. *Psychological Medicine*, *53*(14), 1–11. https://doi.org/10.1017/S0033291723000454

Waechter, R., Gallant, C., De Wilde, K., Arens, G., Brady, T., Custodio, J., Wakita, Y., Landon, B., Boateng, Y., Parthab, N., & Bhagat, A. (2023). Prevention of mental illness within public health: An analysis of progress via systematic literature review and a pathway forward. *Preventive Medicine Reports*, *34*, 102249. https://doi.org/10.1016/j.pmedr.2023.102249

Chapter 2

Study 1: 1-Day Online Cognitive Behavioral Therapy-Based Workshops for the Prevention of Postpartum Depression

Authors: Zoe Boland, Nancy Lloyd, Hayley Layton, Ryan J. Van Lieshout

Context and Implications: This study aimed to determine the feasibility of an online 1-day CBT-based prevention intervention for our participants, in support of a future full-scale randomized control trial. We found that the workshop was feasible to our participants and that it was possible to proceed with the RCT. The key takeaway from our results is our ability to develop a feasible intervention in terms of study design, recruitment, retention rates and participant satisfaction.

Acknowledgements: We would like to thank the study participants for their contributions to this study. Dr. Van Lieshout is supported by the Canada Research Chairs program.

Conflicts of interest: No conflicts of interest

Submitted: Journal of Obstetrics and Gynaecology Canada, published October 13, 2023

Study Title: Online 1-Day CBT-Based Workshops for Preventing Postpartum Depression

To the editor:

Postpartum depression (PPD) affects up to 1 in 5 mothers[1] and if left untreated costs as much as $150,000 per case over the lifespan.[2] With PPD being an ideal candidate for prevention due to its commonality, a clear window for intervention (pregnancy), and risk factors being well-established and easily identifiable, the US Preventive Services Task Force (USPSTF) recently recommended that pregnant persons at high risk for PPD be provided with preventive counseling interventions.[3] Despite this recommendation, almost no scalable, evidence-based interventions that are capable of effectively and efficiently preventing PPD exist, with current interventions being neither time nor cost-effective and having low adherence rates.

Given high rates of PPD and its adverse effects on mothers and their families and the relative lack of efficient effective psychotherapeutic interventions for preventing PPD, safe, novel, and efficient preventive interventions are needed. Since large 1-day workshops appear to successfully treat depression in general population samples and in the postpartum period, given the widespread interest and investment of public health units across Ontario in maternal and child health, online 1-day CBT-based workshops for preventing PPD should be developed and tested.

This report will assess our ability to develop a 1-day prevention intervention, the feasibility of our study design, recruitment, and retainment strategies, its acceptability to participants and preliminary estimates of effect in support of a future full-scale randomized control trial.

Study design:

We used a pretest-post-test study design with no control group and assessed workshop effects on depression, PPD symptoms, anxiety comorbid to PPD, mother-infant relationships and cost-effectiveness. We developed the content for our prevention workshop as well as an accompanying script and intervention manual for participants using feedback from peer and professional therapists.

Participants (N = 38) were recruited through public health units, midwives and social media and were eligible if they were ≥18 years, fluent in English, in their 3rd trimester, living in Ontario, and not currently meeting diagnostic criteria for a major depressive episode and/or meeting the requirements for having the 6 major PPD risk factors.

Participants were administered questionnaires both online (demographics, ANRQ, EPDS, GAD-7, IBQ, PBQ, MSPSS, PSS, EQ-5D-5L) through survey links and via telephone (MINI) at four timepoints: at baseline prior to the workshop (T1), 1 month postpartum (T2), 2 months postpartum (T3) and 3 months postpartum (T4). A CSQ-8 questionnaire was sent 1 week post-workshop to assess participants' satisfaction with the workshop.

Results:

We were able to successfully recruit 38 participants into the study before the July workshop dates. Out of the 38 participants enrolled in the study, 31 completed the study, meaning a retention rate of 81.6%. Participants rated the workshop with a CSQ-8 mean score of 27.66, showing a high level of satisfaction and acceptability.

EPDS, GAD-7, MSPSS, PSS, scores pre- and at the three post-workshop timepoints, as well as PBQ and IBQ at T2, T3 and T4, are present in the Table. Clinically significant reductions

in PPD and anxiety symptoms from pre- to post-workshop were seen. Perceived stress among participants decreased. Perceived social support scores improved.

Conclusion:

We were able to successfully develop a 1-day prevention intervention for PPD that was shown to be acceptable to study participants. The findings of our study suggest that online 1-day CBT-based workshops for preventing PPD appear to be feasible in terms of study design, given the speed at which participants were recruited and our high retention rate. The next steps are to proceed with a larger full-scale randomized control trial.

Table. Scale scores at T1, T2, T3 and T4

Scales	T1 Mean (SD)	Post-workshop Mean (SD)	T2 Mean (SD)	T3 Mean (SD)	T4 Mean (SD)
EPDS	8.95 (4.67)	n/a	6.56 (4.71)	6.81 (4.76)	6.42 (4.49)
GAD	6.46 (4.75)	n/a	4.72 (3.99)	5.13 (4.75)	4.29 (3.48)
MSPSS	5.73 (.81)	n/a	6.07 (1.02)	6.02 (.72)	6.05 (.66)
PSS	21.08 (2.99)	n/a	20.25 (3.35)	20.03 (2.82)	19.10 (2.93)
PBQ-IB (T2, T3, T4)	n/a	n/a	6.81 (4.55)	5.97 (4.29)	4.93 (2.95)
PBQ-RPA (T2, T3, T4)	n/a	n/a	2.53 (2.76)	2.74 (2.62)	2.03 (1.61)
PBQ-IFA (T2, T3, T4)	n/a	n/a	3.72 (1.71)	3.45 (1.95)	2.57 (1.72)
IBQ-R-SUR (T2, T3, T4)	n/a	n/a	5.23 (1.22)	5.06 (.83)	4.53 (.78)
IBQ-R-NA (T2, T3, T4)	n/a	n/a	4.28 (1.20)	4.44 (1.06)	4.86 (.78)
IBQ-R-EC (T2, T3, T4)	n/a	n/a	5.60 (.98)	5.56 (.65)	4.50 (.66)
CSQ-8 (1 week post-	n/a	27.66 (3.68)	n/a	n/a	27.52 (3.88)

workshop and T4)					

References

1. Gavin, N. I. *et al.* Perinatal depression: a systematic review of prevalence and incidence. *Obstet. Gynecol.* **106**, 1071–1083 (2005).
2. Bauer, A. & Knapp, M. Best practice for perinatal mental health care: the economic case. 63.
3. O'Connor, E., Senger, C. A., Henninger, M. L., Coppola, E. & Gaynes, B. N. Interventions to Prevent Perinatal Depression: Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA* **321**, 588–601 (2019).

Chapter 3

Study 2: 1-Day Online Cognitive Behavioral Therapy-Based Workshops for the Prevention of Postpartum Depression

Authors: Zoe Boland, Nancy Lloyd, Jesus Serrano Lomelin, Peter Bieling, David L. Streiner, Ryan J. Van Lieshout

Context and Implications: This study sought to determine whether PPD could be prevented with an online 1-day cognitive behavioural therapy (CBT)-based workshop in addition to treatment as usual (TAU) compared to TAU alone. Due to a stopping rule implemented after 25% of participants were recruited we were unable to draw any definitive conclusions regarding the intervention's effectiveness. The key takeaway is that in spite of the stopping rule implementation, our results show enough promise for further testing with a higher-risk sample.

Acknowledgements: We would like to thank the study participants for their contributions to this study. Dr. Van Lieshout is supported by the Canada Research Chairs program.

Conflicts of interest: No conflicts of interest

Status: In preparation for journal submission to the Journal of Affective Disorders

ABSTRACT

Background: Postpartum depression (PPD) affects up to 1 in 5 birthing parents and is associated with an increased risk of future depressive episodes and problems in offspring. We aimed to determine if PPD could be prevented with online 1-day cognitive behavioral therapy (CBT)-based workshops.

Methods: This randomized controlled trial enrolled pregnant persons at 28-38 weeks gestation living in Ontario and at increased risk for PPD, but free of current major depressive disorder (MDD). Participants received the workshop plus treatment as usual (TAU; experimental group) or TAU alone (control group). We assessed MDD diagnosis, levels of PPD symptoms, anxiety, social support, mother-infant relationship quality, and infant temperament at enrollment and at one, two, and three months postpartum.

Results: Since <10% of participants in either group developed MDD, trial recruitment was stopped. Data were collected up to two months postpartum in those already enrolled. Among these participants (n=124), a trend toward greater reductions in EPDS scores were seen in the experimental group at two months postpartum (p=0.06). Higher risk participants (baseline Edinburgh Postnatal Depression Scale Score ≥7) in the experimental group showed larger, statistically significant reductions in PPD and anxiety at two months postpartum.

Limitations: Eligibility criteria resulted in a sample that did not develop MDD at rates high enough to continue the trial. Activation of this stopping rule limited statistical power.

Conclusions: Definitive conclusions regarding the effectiveness of online 1-day workshops for preventing PPD are not possible but the results of this study support further testing with a higher risk sample.

INTRODUCTION

Postpartum depression (PPD) affects up to 1 in 5 birthing parents (Gavin et al., 2005) and can cost up to $150,000 per case over the lifespan (Bauer et al., 2014). It is associated with an increased risk of future depressive episodes, as well as cognitive, emotional, and behavioral problems in offspring (Slomian et al., 2019). When birthing parents with elevated levels of depressive symptoms, but not syndromal major depressive disorder (MDD), are counted, as many as 1 in 3 individuals can be negatively affected (Meaney, 2018).

Despite its high prevalence and significant adverse effects on parents and families, healthcare systems remain poorly equipped to handle mental health difficulties that require urgent treatment like PPD, and so, as few as 10% of individuals receive evidence-based treatments (Bowen et al., 2012; E. Q. Cox et al., 2016). Given these realities, it is important that interventions aimed at preventing PPD are developed and tested.

Postpartum depression is an ideal disorder for prevention due to its high prevalence, clear window for intervention (pregnancy), and relatively easily identifiable risk factors. However, it is not clear whether universal primary preventive programs are effective. Nonetheless, in 2019 the United States Preventive Services Task Force (USPSTF) published a statement recommending that at least those who are at high-risk for developing PPD be provided with preventive counseling interventions (O'Connor et al., 2019).

While the systematic review of randomized controlled trials that accompanied the USPSTF recommendation suggested that counseling interventions were associated with a reduced risk of PPD (US Preventive Services Task Force, 2019), there was substantial heterogeneity among these studies in how high-risk populations were defined, as well as in the characteristics and effectiveness of these interventions. Whereas most of the 17 trials favored the

intervention over the control condition for preventing PPD, just five trials showed statistically significant effects in the meta-analysis (Dimidjian et al., 2016; Milgrom et al., 2011; Ortiz Collado et al., 2014; Tandon et al., 2011; Zlotnick et al., 2016). Of these five trials, most utilized cognitive behavioral therapy (CBT) or interpersonal psychotherapy (IPT)-based interventions that consisted of four to nine weekly sessions delivered individually or in small groups in community settings or in participants' homes. The samples in these studies were generally relatively small and at very high-risk by virtue of the fact that they were predominantly newcomers, Black or Hispanic with low income, and/or individuals on public assistance. Moreover, attrition rates were relatively high in these trials, suggesting that more work examining which interventions work best, and other practical considerations like treatment brevity and efficiency would be important considerations.

Also, trials of PPD prevention interventions that have been conducted since 2019 have generally contained relatively small sample sizes and have had limited success at preventing PPD. A systematic review and meta-analysis of 16 app-based psychological interventions for preventing PPD was recently published and it suggested that interventions tested in just four trials were effective (Miura et al., 2023). Of these four studies (Liu et al., 2022; Qin et al., 2022; Shorey et al., 2019; Zhang et al., 2023), three of them recruited and administered the intervention during the postnatal period. Moreover, most of these app-based interventions lasted four to 12 weeks and mainly recruited from hospitals in mainland China and Singapore, with participants being primarily primiparous, living in urban areas, and with a relatively high level of education. All studies were limited by small sample sizes, with one lacking a control group. A more recent large-scale RCT (n=5017) compared the effectiveness of a mobile app that delivered a CBT-

based intervention in 6 weekly sessions added to TAU during pregnancy, but it was not shown to be effective (Nishi et al., 2022).

While it appears that some counseling interventions may be effective in preventing PPD in specific high-risk groups, their duration, timing, and intensity (e.g., consisting of multiple sessions and lasting several weeks), can make them difficult for some pregnant people to complete, particularly if they have other children and/or are also working outside of the home. Not surprisingly, attrition can be an issue for preventive counselling interventions lasting multiple sessions over several weeks, as it can be for app-based interventions, particularly those that are not supported by a therapist. Given the heterogeneity seen in the interventions and study populations evaluated in previous trials, it is unclear which interventions are most effective and for whom.

In light of these gaps, safe, novel, and efficient preventive interventions are needed. The delivery of very brief psychotherapeutic interventions (e.g., lasting one day) in large groups (i.e. up to 30 people) is a relatively new phenomenon, particularly in the field of perinatal mental health, but it has shown promise for treating PPD. One-day CBT-based workshops for treating PPD have proven effective when delivered by professionals and peers and when administered in-person and online (Babiy et al., 2024; Merza et al., 2023; Van Lieshout et al., 2021, 2023). A recent small pilot study also suggested that a newly developed 1-day CBT-based workshop for preventing PPD was acceptable to participants and supported the conduct of a larger randomized controlled trial (Boland et al., 2024).

Given this background, the primary objective of the present study was to determine if an online 1-day CBT-based workshop for preventing PPD added to treatment as usual (TAU) was more effective than TAU alone at preventing PPD at up to three months postpartum. We also set

out to examine its impact on postpartum anxiety, social support, the mother-infant relationship, and infant temperament.

METHODS

Trial design and setting:

This trial was a parallel-group RCT conducted in the province of Ontario, Canada. Participants were randomly allocated in a 1:1 ratio to experimental (workshop plus TAU) or control (TAU alone) groups. Given that healthcare is universally available Ontario, Canada, participants could continue to receive any other healthcare services that they wished (e.g., medication, psychotherapy, and any other form of support).

Blocked randomization with block sizes of 4, 6, and 8 was used to ensure approximately equal participant numbers in each arm and to reduce potential selection bias (block sizes remained confidential). In the current study, data were to be collected from participants at baseline (T1), and at one (T2), two (T3), and three (T4) months postpartum using the Research Electronic Data Capture (REDCap) platform (Harris et al., 2009). The study was approved by the Hamilton Integrated Research Ethics Board (HiREB) (HiREB approval number #13351) and the trial was registered at clinicaltrials.gov (ID: NCT05753176).

Participants:

Participants were recruited via online advertising, social media (e.g., Facebook, Instagram) posts and advertising, and through public health units in the province of Ontario in Canada. Pregnant persons were eligible to participate if they were living in Ontario, ≥18 years-old, 28-38 weeks gestation at the time of the workshop, fluent in English, and did not have current MDD. Potential participants also had to be at increased risk for PPD which in this study

was defined as one or more of: a score ≥23 on the Antenatal Risk Questionnaire (ANRQ) (Austin et al., 2013), a past history of major depressive disorder or generalized anxiety disorder (GAD), an income lower than the Canadian low income cut-off (LICO), single marital status, poor social support, a past history of physical and/or sexual abuse, and/or a major life stressor within the last 12 months (e.g. death of a loved one, divorce, etc.).

Intervention:

A novel prevention-specific workshop (that differed from our previous 1-day CBT-based treatment workshop; Van Lieshout et al., 2021) was developed for this study. This preventive intervention consisted of a 6-hour interactive workshop based on cognitive behavioral therapy (CBT) principles and was developed by a perinatal psychiatrist (RJV). The workshop was delivered in four modules and contained content on PPD etiology (with a focus on modifiable risk factors), the development of cognitive skills including cognitive restructuring, behavioral techniques such as behavioral activation and problem solving, as well as goal setting and action planning. Participants were provided with a workshop manual that included worksheets to encourage practice of skills after the workshop. Seven individuals (two public health nurses, three social workers, one registered psychotherapist, and one psychiatrist) were trained to deliver the workshops. During the study, the workshops were delivered by pairs of facilitators via Zoom and took place on Saturdays between December 2022 and April 2023.

Post-workshop emails were sent weekly for 4 weeks, and then at 6, 8, and 12 weeks to remind participants to utilize the skills and practice the techniques they had learned. Control group participants also received emails at the same time points, thanking them for their ongoing participation, highlighting indicators that might suggest that they should seek help for their

mental health, and providing local resources to support this, as well as the Canadian clinical practice guidelines for the treatment of perinatal depression (MacQueen et al., 2016).

Outcomes:

Our primary outcome was the development of current major depressive disorder (MDD) at three months postpartum assessed using the Mini International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998). The MINI is a validated structured diagnostic interview used widely in research and clinical settings to identify psychiatric disorders according to the DSM-5. The MINI was conducted via telephone by study staff blind to the participants' group status. The remainder of our outcomes were collected by questionnaires in REDCap which were sent via email.

Our secondary outcomes included levels of PPD symptoms, anxiety, social support, quality of the mother-infant relationship, and infant temperament. Levels of PPD symptoms were assessed using the Edinburgh Postnatal Depression Scale (EPDS) (Cronbach's $\alpha = .83$) (J. L. Cox et al., 1987). The EPDS is a 10-item measure that assesses symptoms during the previous seven days. Each item is scored on a 4-point scale (ranged 0-3) with a score ranging from 0-30, with scores of 10 or more indicating possible PPD.

Postpartum anxiety was assessed using the General Anxiety Disorder-7 scale (GAD-7) (Cronbach's $\alpha = .86$), a 7-item self-reported scale measuring symptoms of generalized anxiety disorder, the most frequent comorbidity of PPD (Spitzer et al., 2006).

Social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) (Cronbach's $\alpha = .94$) (Zimet et al., 1988). The MSPSS is a 12-item measure of adequacy of social support from friends, family, and significant others. It is scored using a 5-point Likert scale, with higher scores indicating higher perceived adequacy of social support.

The quality of the mother-infant relationship was measured using the Postpartum Bonding Questionnaire (PBQ) (Cronbach's $\alpha = .90$) (Brockington et al., 2006). The PBQ is a 25-item maternal-report scale detecting disorders of the mother-infant relationship. It includes four subscales: impaired bonding, rejection and pathological anger towards the infant, infant-focused anxiety (IFA), and incipient abuse. The incipient abuse scale was not examined during the study due to its low sensitivity.

Infant temperament was assessed using the Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R-VSF) (Cronbach's $\alpha = .85$) (Putnam et al., 2014). The IBQ-R-VSF is a 37-item parent-report measure of infant temperament over the past week on a 7-point scale. This is measured over three factors: positive affectivity/surgency, negative emotionality, and orienting/regulatory capacity.

Since the PBQ and IBQ-R-VSF involve reporting on an infant, these questionnaires were only administered at T2, T3, and T4. Sociodemographic characteristics of the sample such as age, ethnicity, marital status, level of education, household income, and use of medication and talk therapy were collected at T1.

Participant satisfaction with the workshop was assessed using the Client Satisfaction Questionnaire-8 (CSQ-8) (Cronbach's $\alpha = .85$) (Larsen et al., 1979). The CSQ-8 is an 8-item measure that assesses satisfaction with services in an outpatient setting but has also been used in broader healthcare settings. Each item is scored on a 4-point scale and scores of 8-20 indicate low levels of satisfaction, 21-26 indicate moderate satisfaction, and 27-32 indicate high levels of satisfaction.

Sample Size and Statistical Analyses

The trial was powered to detect a treatment effect size of d=0.3, with a two-sided p-value=0.05 and 80% power. Anticipating an attrition rate of 15%, the target sample size was n=410 (205 per arm). The sample size calculation was conducted using Repeated Measure and Sample Size (RMASS) (Hedeker et al., 1999).

Originally, multi-level mixed-effects regression models using the restricted maximum likelihood (REML) method were to be employed to examine the trajectories of all study outcomes. Contrasts were to be used to determine differences between the treatment and control groups at individual time points, with a two-level hierarchy to nest the outcomes at each study timepoint (T1-T4) within each individual participant. Predicted means with 95% confidence intervals (CIs) were to be reported for each group at every time point. Marginal effects post-estimation tests with Bonferroni correction for 95% CIs and p-values were to be used to estimate changes in outcome means between treatment and control groups at each time point, as well as differences between groups at follow-up points compared to baseline.

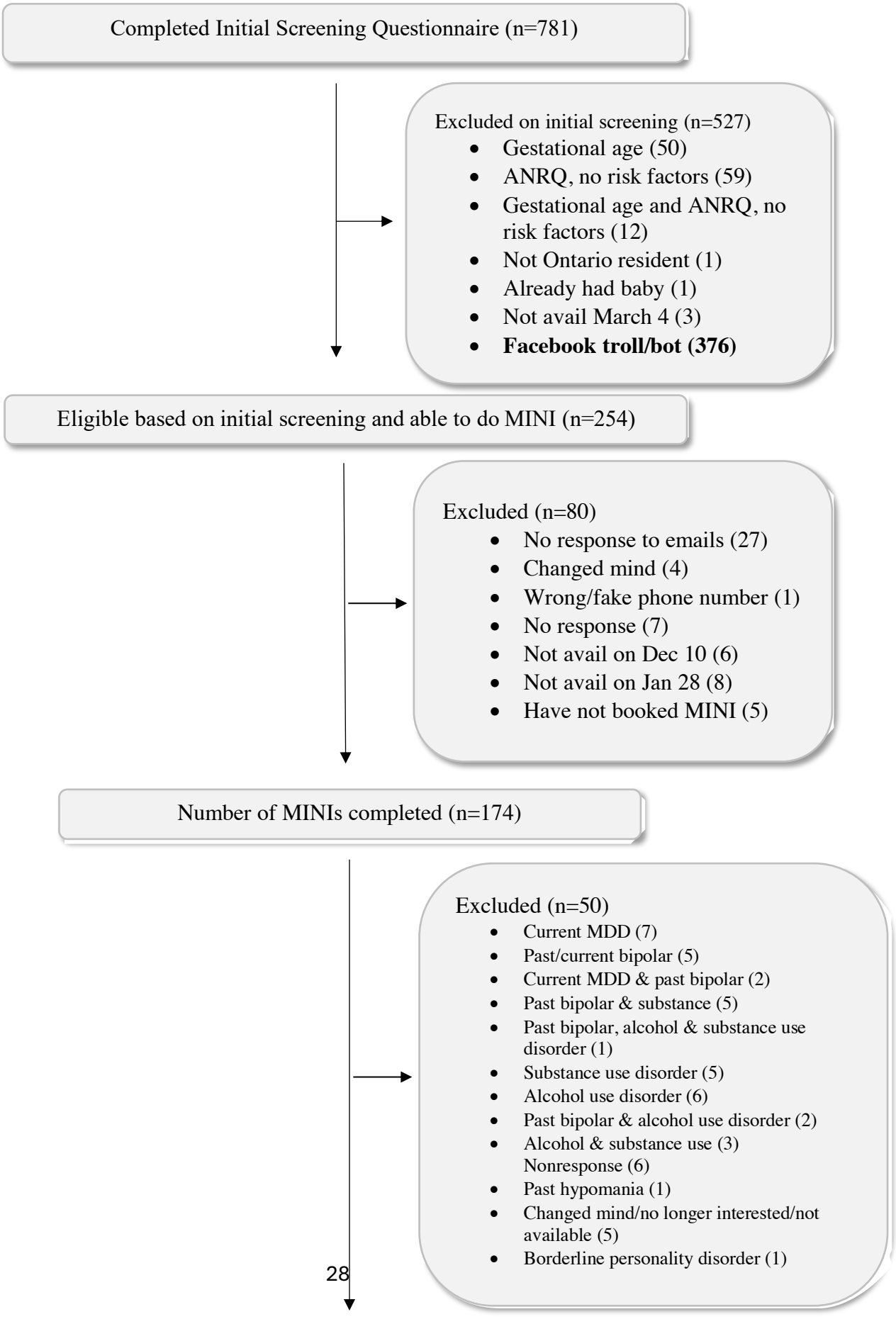
Dichotomous outcomes were to be analyzed using generalized estimating equations (GEEs) with a binomial logit-link binomial distribution and an AR1 covariance structure. These models estimated odds ratios between groups at each timepoint analogously to logistic regression but directly model change in odds of diagnosis in a repeated-measures design, rather than cross-sectionally.

RESULTS

Originally, data collection for participants was supposed to occur until three months postpartum (T4). However, given a lack of consistency in the literature in terms of what might represent a sample at high-risk for PPD, we implemented a stopping rule because lack of sufficient MDD development would have resulted in an inability to test our primary hypothesis. The stopping rule was implemented at T2 (one month post-partum) and was defined as less than 10% of the sample developing MDD when 25% (the first 124 participants recruited) of the sample reached the T2 assessment point. Since this threshold was not reached (just two participants developed MDD by T2), recruitment was stopped. However, we had recruited 124 participants by this time point and most had completed T2 and T3 data collection, data at these time points were collected for all 124 participants and analyses were conducted on these data. Analyses were conducted for all 124 participants, and a subgroup analysis was also conducted for participants with baseline EPDS scores ≥7 (since this is an indicator of elevated symptoms of PPD, one of the largest risk factors during pregnancy for developing PPD) (McCabe-Beane et al., 2016).

Figure 1 displays participant flow through the study. Participant recruitment occurred from October 2022 to April 2023. A total of 781 participants completed the initial screening questionnaire prior to the implementation of the stopping rule, and 254 participants were deemed eligible based on their initial screening and asked to complete the MINI. One-hundred and seventy-four participants completed the MINI, and 124 participants were randomized into either the experimental (n = 62) or control group (n = 62).

Fig. 1: Flowchart of participants throughout the study.


Completed Initial Screening Questionnaire (n=781)
Excluded on initial screening (n=527)
Gestational age (50)
ANRQ, no risk factors (59)
Gestational age and ANRQ, no risk factors (12)
Not Ontario resident (1)
Already had baby (1)
Not avail March 4 (3)
Facebook troll/bot (376)
Eligible based on initial screening and able to do MINI (n=254)
Excluded (n=80)
No response to emails (27)
Changed mind (4)
Wrong/fake phone number (1)
No response (7)
Not avail on Dec 10 (6)
Not avail on Jan 28 (8)
Have not booked MINI (5)
Number of MINIs completed (n=174)
Excluded (n=50)
Current MDD (7)
Past/current bipolar (5)
Current MDD & past bipolar (2)
Past bipolar & substance (5)
Past bipolar, alcohol & substance use disorder (1)
Substance use disorder (5)
Alcohol use disorder (6)
Past bipolar & alcohol use disorder (2)
Alcohol & substance use (3)
Nonresponse (6)
Past hypomania (1)
Changed mind/no longer interested/not available (5)
Borderline personality disorder (1)

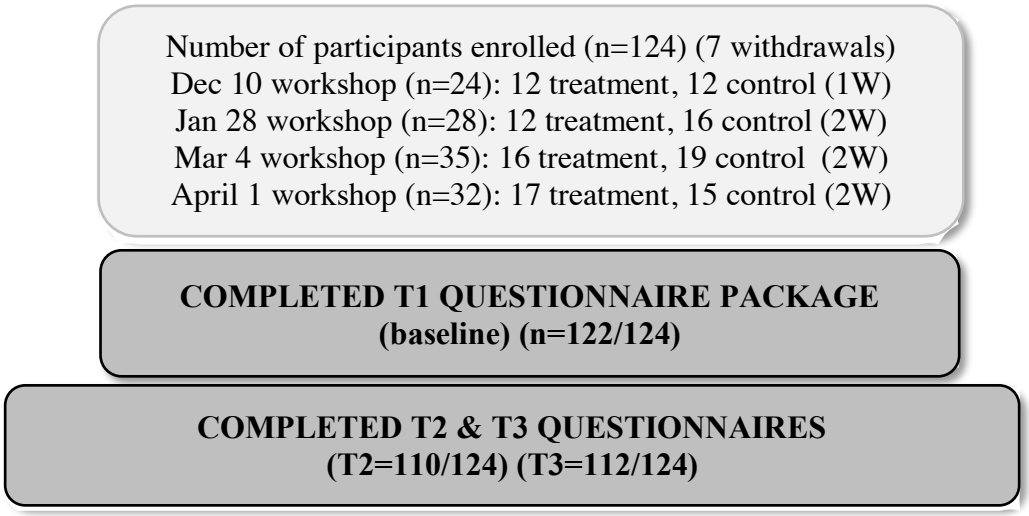


Table 1 shows the baseline characteristics of the treatment and control groups.

Table 1. Baseline characteristics of study participants[a]

Characteristic	**Experimental (n=62)**	**Control (n=62)**
Maternal age, years	32.0 (4.5)	32.9 (5.0)
Marital status, n/total n (%)		
Single	6/61 (9.8)	6/62 (9.7)
Married/common law	55/61 (90.2)	56/62 (90.3)
Social support, n/total n (%)	10/62 (16.1)	11/62 (17.7)
Ethnicity, n/total n (%)		
White	40/61 (65.6)	45/62 (72.6)
Non-White	21/61 (34.4)	17/62 (27.4)
Education, years	15.6 (2.4)	15.8 (1.7)
Income support, yes n/total n (%)	2/61 (3.3)	5/62 (8.1)

Household status		
Rent	21/61 (34.4)	20/62 (32.3)
Own	40/61 (65.6)	42/62 (67.7)
Occupational status		
Employed full-time	40/61 (65.6)	38/61 (62.3)
Employed part-time	5/61 (8.2)	3/61 (4.9)
Unemployed	5/61 (8.2)	5/61 (8.2)
Student	7/61 (11.5)	6/61 (9.8)
On leave	4/61 (6.6)	9/61 (14.7)
Low income (LICO), n/total n (%)	6/62 (9.7)	6/62 (9.7)
Gestational age (weeks)	30.6 (3.1)	30.5 (3.1)
Antidepressant use, yes n/total n (%)	11/62 (17.7)	12/62 (19.3)
Past major depressive disorder (MINI), n/total n (%)	47/62 (75.8)	49/62 (79.0)
Abuse, n/total n (%)	36/62 (58.1)	31/62 (50.0)
Stress, n/total n (%)	26/62 (41.9)	23/62 (37.1)
EPDS Score (Baseline)	8.4 (4.7)	9.1 (5.1)
GAD-7 Score (Baseline)	5.2 (4.0)	6.4 (4.7)
ANRQ Score (Baseline)	31.9 (9.0)	30.5 (7.8)
ANRQ Score ≥23 (Baseline), n/total n (%)	53/62 (85.5)	55/62 (88.7)

[a]Values are shown as mean (SD) unless otherwise noted. In variables with missing values, n is indicated (n=#).

Abbreviations: EPDS=Edinburgh Postnatal Depression Scale, GAD-7=Generalized Anxiety Disorder 7-item scale, MINI=Mini-International Neuropsychiatric Interview.

Table 2 displays the trajectories of scale scores for all participants in the study along with estimated group differences at each time point.

Table 2. Predicted means for all outcomes at each time point for all participants (n=124)

	Time	**Workshop Mean (95% CI)**	**Control Mean (95% CI)**	**Mean difference (95% CI)[a]**	**p-value**
EPDS	T1	8.3 (7.4, 9.2)	9.1 (8.3, 10.0)	- 0.8 (-2.3, 0.7)	0.58
	T2	8.3 (7.4, 9.3)	8.9 (8.0, 9.8)	- 0.6 (-2.1, 1.1)	0.41
	T3	7.0 (6.0, 7.9)	8.2 (7.3, 9.1)	**- 1.2 (-2.5, 0.1)**	**0.06**
GAD-7	T1	5.6 (4.8, 6.4)	6.1 (5.4, 6.9)	-0.5 (-1.9, 0.8)	0.99
	T2	5.9 (5.0, 6.7)	6.5 (5.7, 7.3)	- 0.6 (-2.0, 0.8)	0.83
	T3	5.1 (4.3, 6.0)	6.1 (5.3, 6.9)	-1.0 (-2.3, 0.5)	0.31

Social Support	T1	5.4 (4.7, 5.5)	5.8 (5.5, 6.1)	-0.4 (-0.9, 0.1)	0.12
	T2	5.7 (5.4, 6.0)	5.9 (5.6, 6.2)	-0.2 (-0.7, 0.3)	0.83
	T3	5.5 (5.2, 5.8)	5.9 (5.6, 6.2)	-0.4 (-0.9, 0.1)	0.18
PBQ Infant Bonding	T2	15.3 (13.9, 16.6)	15.2 (13.9, 16.5)	0.1 (-2.1, 2.3)	0.95
	T3	14.7 (13.3, 16.1)	14.5 (13.1, 15.8)	0.2 (-1.9, 2.4)	0.81
PBQ Infant Focused Anxiety	T2	5.9 (5.2, 6.6)	5.9 (5.2, 6.6)	0.0 (-1.1, 1.1)	0.95
	T3	5.3 (4.6, 6.0)	5.2 (4.6, 5.9)	0.1 (-1.0, 1.2)	0.87
PBQ Rejection & Pathological Anger	T2	8.2 (7.4, 9.0)	8.1 (7.3, 8.9)	0.1 (-1.2, 1.4)	0.83
	T3	7.8 (7.0, 8.6)	7.7 (7.0, 8.5)	0.1 (-1.2, 1.3)	0.90
IBQ-R Surgency	T2	5.1 (4.7, 5.4)	5.4 (5.1, 5.8)	-0.3 (-0.9, 0.2)	0.29
	T3	5.1 (4.8, 5.5)	5.2 (4.9, 5.6)	-0.1 (-0.6, 0.5)	0.99
IBQ-R Negative Affectivity	T2	4.7 (4.4, 5.0)	4.9 (4.6, 5.2)	-0.2 (-0.7, 0.4)	0.95
	T3	4.6 (4.3, 4.9)	4.6 (4.3, 4.9)	0.0 (-0.6, 0.5)	0.99
IBQ-R Regulation/emotional control	T2	5.6 (5.4, 5.9)	5.8 (5.5, 6.0)	-0.2 (-0.5, 0.3)	0.81
	T3	5.9 (5.6, 6.1)	5.8 (5.6, 6.0)	0.1 (-0.3, 0.5)	0.99

In the analyses examining outcomes for all participants (n=124), no statistically significant differences were observed between experimental and control groups. However, a

trend toward a larger decrease in EPDS scores at two months postpartum (T3) in the experimental group was noted (p=0.06).

The results of a separate analysis on participants who had baseline (T1) EPDS scores ≥7 are shown in Table 3.

Table 3. Predicted means for all outcomes at each time point for all participants a baseline EPDS score of 7 or more (n=78)

	Time	**Workshop Mean (95% CI)**	**Control Mean (95% CI)**	**Mean difference (95% CI)[a]**	**p-value**
EPDS	T1	11.0 (9.9, 12.1)	12.0 (10.9, 13.1)	-1.0 (-2.6, 0.6)	0.21
	T2	9.3 (8.1, 10.6)	10.1 (9.0, 11.3)	-0.8 (-2.5, 0.9)	0.34
	T3	7.7 (6.5, 9.0)	9.6 (8.5. 10.8)	**-1.9 (-3.6, -0.2)**	**0.03**
GAD-7	T1	7.2 (6.0, 8.5)	8.5 (7.2, 9.7)	-1.2 (-3.3, 0.9)	0.48
	T2	6.4 (5.0, 7.7)	7.9 (6.6, 9.2)	-1.5 (-3.8, 0.7)	0.31
	T3	6.0 (4.6, 7.3)	7.8 (6.6, 9.1)	**-1.9 (-3.7, -0.05)**	**0.04**
Social Support	T1	5.1 (4.7, 5.5)	5.5 (5.2, 5.9)	-0.4 (-1.0, 0.2)	0.30
	T2	5.5 (5.1, 5.9)	5.7 (5.3, 6.0)	-0.2 (-0.8, 0.5)	0.99

	T3	5.5 (5.1, 5.8)	5.7 (5.4, 6.1)	-0.2 (-0.9, 0.4)	0.85
PBQ Infant Bonding	T2	16.2 (14.5, 18.1)	15.3 (13.7, 17.0)	0.9 (-1.8, 3.7)	0.91
	T3	15.7 (14.0, 17.5)	14.4 (12.8, 16.1)	1.3 (-1.5, 4.1)	0.58
PBQ Infant Focused Anxiety	T2	6.2 (5.2, 7.1)	6.0 (5.1, 6.8)	0.2 (-1.3, 1.7)	0.99
	T3	5.7 (4.8, 6.6)	5.3 (4.4, 6.2)	0.4 (-1.1, 1.9)	0.99
PBQ Rejection & Pathological Anger	T2	8.8 (7.7, 9.8)	8.1 (7.1, 9.1)	0.7 (-1.0, 2.3)	0.76
	T3	8.2 (7.2, 9.3)	7.9 (6.9, 8.9)	0.3 (-1.4, 1.9)	0.99
IBQ-R Surgency	T2	5.3 (4.9, 5.7)	5.7 (5.4, 6.1)	-0.4 (-1.1, 0.2)	0.25
	T3	5.2 (4.8, 5.6)	5.3 (4.9, 5.7)	-0.1 (-0.7, 0.6)	0.99
IBQ-R Negative Affectivity	T2	4.8 (4.3, 5.2)	5.1 (4.8, 5.5)	-0.3 (-1.0, 0.3)	0.40
	T3	4.7 (4.3, 5.2)	4.8 (4.4, 5.2)	-0.1 (-0.7, 0.6)	0.99
IBQ-R Regulation/emotional control	T2	5.5 (5.1, 5.8)	5.9 (5.6, 6.2)	-0.4 (-0.9, 0.1)	0.13
	T3	5.8 (5.5, 6.1(	5.7 (5.4, 6.0)	0.1 (-0.4, 0.6)	0.99

For those with a baseline EPDS score ≥7, EPDS score reductions were larger in the experimental group at two months postpartum (p=0.03), as were scores on the GAD-7 (p=0.04).

Finally, the mean CSQ-8 score of participants was 27.52, indicating a high level of satisfaction with the workshop.

DISCUSSION

Given that few participants developed MDD and a study stopping rule was triggered at two months postpartum, we report the results of the analyses of the 124 participants that were recruited up to that point. In this sample, a trend toward greater reductions in EPDS scores were observed at two months postpartum in the experimental group ($p=0.06$). However, in a higher risk sample of participants (with EPDS scores ≥ 7), experimental group participants had better EPDS and GAD-7 scores at two months postpartum. Given that a few individuals in our sample developed MDD, our risk criteria need to be revised and a full-scale trial needs to be conducted in order to fully assess the potential of online 1-day CBT-based workshops for preventing PPD.

While it is unclear why so few participants in either group developed MDD, it is likely that the risk criteria selected for this study failed to generate a sample at high enough risk for developing MDD. It is certainly possible that access to TAU in Ontario where healthcare is universally available played a role in mitigating this risk, as is the fact that the sample contained a relatively small number of individuals facing significant disadvantage (socioeconomic or otherwise). However, the low rate of conversion to MDD in the sample makes it difficult to assess the potential clinical impact of 1-day CBT-based workshops for preventing PPD, and so a higher risk sample should be recruited and the potential effectiveness of the workshop should be assessed.

While we did not detect a statistically significant reduction in levels of PPD in our complete sample of 124 participants, we only analyzed data from 25% of our planned sample ($N=410$), and so almost certainly did not have adequate statistical power to detect these reductions. However, despite this relatively small sample size, there was some suggestion that the intervention could lead to reductions in EPDS scores in the experimental group up to two

months postpartum. Regardless, the potentially lower risk nature of our sample (e.g., mainly White, with universal access to healthcare, a relatively high level of education, etc.) may have contributed to the lack of a statistically significant finding.

Counseling interventions found to be effective in previous PPD prevention RCTs have utilized samples from specific socioeconomic backgrounds that were often at a much higher psychosocial risk than ours (Tandon et al., 2011; Zlotnick et al., 2016). Additionally, their interventions consisted of a larger number of sessions delivered in either group settings, individually, or in the home, and so it remains unclear if the dosage and/or content of the 1-day prevention workshop tested in this study is sufficient to prevent PPD, and/or which population(s) it may have clinical utility with (if any). However, despite the limited sample size, one might suggest that the workshops may help to reduce PPD and postpartum anxiety symptoms in those with EPDS scores ≥7 at baseline. These individuals may be at higher risk for PPD because they already have symptoms which could provide more room for improvement and/or increase their motivation to utilize the strategies taught in the workshop. Regardless, future studies are warranted to determine if this intervention could be effective for preventing PPD and the groups with which it could be effective.

While the results of this study suggest that a 1-day CBT-based workshop for preventing PPD is associated with high levels of satisfaction and could have some promise, its limitations should be noted. First, we did not recruit our full sample because too few participants developed MDD which limited the statistical power we had to detect differences between the experimental and control groups. Second, the sample consisted of birthing parents living in Ontario, Canada, and most were White and married, had a high school education or greater, and had free access to universal healthcare. These might have impacted the ability of the study to detect an effect, as

well as limiting the generalizability of its results. It is also important to note that all outcomes in this study were self-reported by participants. Moreover, with our final follow-up assessment occurring at two months postpartum, the potential long-term clinical effects of the intervention are not known. It is also important to note that the heterogeneity of our sample led to high variance in our baseline scores.

Given the prevalence and impact of PPD on birthing parents and their families, continued efforts aimed at developing and testing evidence-based, safe, and efficient preventive interventions for those at risk of developing PPD are warranted. Future efforts should be directed at a full-scale RCT with a higher risk sample considering the brevity and potential benefits of 1-day CBT-based workshops for preventing PPD. If successful, this intervention could help prevent PPD in a large number of individuals, especially considering the importance of maternal mental health to families and society.

References

Austin, M.-P., Colton, J., Priest, S., Reilly, N., & Hadzi-Pavlovic, D. (2013). The antenatal risk questionnaire (ANRQ): Acceptability and use for psychosocial risk assessment in the maternity setting. *Women and Birth: Journal of the Australian College of Midwives*, *26*(1), 17–25. https://doi.org/10.1016/j.wombi.2011.06.002

Babiy, Z., Layton, H., Savoy, C. D., Xie, F., Brown, J. S. L., Bieling, P. J., Streiner, D. L., Ferro, M. A., & Van Lieshout, R. J. (2024). One-Day Peer-Delivered Cognitive Behavioral Therapy-Based Workshops for Postpartum Depression: A Randomized Controlled Trial. *Psychotherapy and Psychosomatics*, *93*(2), 129–140. https://doi.org/10.1159/000536040

Bauer, A., Parsonage, M., Knapp, M., Iemmi, V., & Adelaja, B. (2014). The costs of perinatal mental health problems. *Personal Social Services Research Unit*. http://eprints.lse.ac.uk/59885/1/__lse.ac.uk_storage_LIBRARY_Secondary_libfile_shared_repository_Content_Bauer%2C%20M_Bauer_Costs_perinatal_%20mental_2014_Bauer_Costs_perinatal_mental_2014_author.pdf

Boland, Z., Lloyd, N., Layton, H., & Lieshout, R. J. V. (2024). Development and Feasibility of Online 1-Day CBT-Based Workshops for Preventing Postpartum Depression. *Journal of Obstetrics and Gynaecology Canada*, *46*(2). https://doi.org/10.1016/j.jogc.2023.102241

Bowen, A., Bowen, R., Butt, P., Rahman, K., & Muhajarine, N. (2012). Patterns of depression and treatment in pregnant and postpartum women. *Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie*, *57*(3), 161–167. https://doi.org/10.1177/070674371205700305

Brockington, I. F., Fraser, C., & Wilson, D. (2006). The Postpartum Bonding Questionnaire: A validation. *Archives of Women's Mental Health*, *9*(5), 233–242. https://doi.org/10.1007/s00737-006-0132-1

Cox, E. Q., Sowa, N. A., Meltzer-Brody, S. E., & Gaynes, B. N. (2016). The Perinatal Depression Treatment Cascade: Baby Steps Toward Improving Outcomes. *The Journal of Clinical Psychiatry*, *77*(9), 1189–1200. https://doi.org/10.4088/JCP.15r10174

Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry: The Journal of Mental Science*, *150*, 782–786. https://doi.org/10.1192/bjp.150.6.782

Dimidjian, S., Goodman, S. H., Felder, J. N., Gallop, R., Brown, A. P., & Beck, A. (2016). Staying well during pregnancy and the postpartum: A pilot randomized trial of mindfulness-based cognitive therapy for the prevention of depressive relapse/recurrence. *Journal of Consulting and Clinical Psychology*, *84*(2), 134–145. https://doi.org/10.1037/ccp0000068

Gavin, N. I., Gaynes, B. N., Lohr, K. N., Meltzer-Brody, S., Gartlehner, G., & Swinson, T. (2005). Perinatal depression: A systematic review of prevalence and incidence. *Obstetrics and Gynecology*, *106*(5 Pt 1), 1071–1083. https://doi.org/10.1097/01.AOG.0000183597.31630.db

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, *42*(2), 377–381. https://doi.org/10.1016/j.jbi.2008.08.010

Hedeker, D., Gibbons, R. D., & Waternaux, C. (1999). Sample Size Estimation for Longitudinal Designs with Attrition: Comparing Time-Related Contrasts Between Two Groups. *Journal of Educational and Behavioral Statistics*, *24*(1), 70–93. https://doi.org/10.3102/10769986024001070

Larsen, D. L., Attkisson, C. C., Hargreaves, W. A., & Nguyen, T. D. (1979). Assessment of client/patient satisfaction: Development of a general scale. *Evaluation and Program Planning*, *2*(3), 197–207. https://doi.org/10.1016/0149-7189(79)90094-6

Liu, C., Chen, H., Zhou, F., Long, Q., Wu, K., Lo, L.-M., Hung, T.-H., Liu, C.-Y., & Chiou, W.-K. (2022). Positive intervention effect of mobile health application based on mindfulness and social support theory on postpartum depression symptoms of puerperae. *BMC Women's Health*, *22*(1), 413. https://doi.org/10.1186/s12905-022-01996-4

MacQueen, G. M., Frey, B. N., Ismail, Z., Jaworska, N., Steiner, M., Lieshout, R. J. V., Kennedy, S. H., Lam, R. W., Milev, R. V., Parikh, S. V., Ravindran, A. V., & CANMAT Depression Work Group. (2016). Canadian Network for Mood and Anxiety Treatments (CANMAT) 2016 Clinical Guidelines for the Management of Adults with Major Depressive Disorder: Section 6. Special Populations: Youth, Women, and the Elderly. *Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie*, *61*(9), 588–603. https://doi.org/10.1177/0706743716659276

McCabe-Beane, J. E., Segre, L. S., Perkhounkova, Y., Stuart, S., & O'Hara, M. W. (2016). The identification of severity ranges for the Edinburgh Postnatal Depression Scale. *Journal of Reproductive and Infant Psychology*, *34*(3), 293–303. https://doi.org/10.1080/02646838.2016.1141346

Meaney, M. J. (2018). Perinatal Maternal Depressive Symptoms as an Issue for Population Health. *The American Journal of Psychiatry*, *175*(11), 1084–1093. https://doi.org/10.1176/appi.ajp.2018.17091031

Merza, D., Layton, H., Savoy, C., Babiy, Z., Campbell, M., Bieling, P. J., Brown, J. S. L., & Van Lieshout, R. J. (2023). Online Peer-Delivered 1-Day Cognitive Behavioral Therapy-Based Workshops for Postpartum Depression: A Pilot Study. *The Journal of Clinical Psychiatry*, *84*(1), 22br14574. https://doi.org/10.4088/JCP.22br14574

Milgrom, J., Schembri, C., Ericksen, J., Ross, J., & Gemmill, A. W. (2011). Towards parenthood: An antenatal intervention to reduce depression, anxiety and parenting difficulties. *Journal of Affective Disorders*, *130*(3), 385–394. https://doi.org/10.1016/j.jad.2010.10.045

Miura, Y., Ogawa, Y., Shibata, A., Kamijo, K., Joko, K., & Aoki, T. (2023). App-based interventions for the prevention of postpartum depression: A systematic review and meta-analysis. *BMC Pregnancy and Childbirth*, *23*(1), 441. https://doi.org/10.1186/s12884-023-05749-5

Nishi, D., Imamura, K., Watanabe, K., Obikane, E., Sasaki, N., Yasuma, N., Sekiya, Y., Matsuyama, Y., & Kawakami, N. (2022). The preventive effect of internet-based cognitive behavioral therapy for prevention of depression during pregnancy and in the postpartum period (iPDP): A large scale randomized controlled trial. *Psychiatry and Clinical Neurosciences*, *76*(11), 570–578. https://doi.org/10.1111/pcn.13458

O'Connor, E., Senger, C. A., Henninger, M. L., Coppola, E., & Gaynes, B. N. (2019). Interventions to Prevent Perinatal Depression: Evidence Report and Systematic Review

for the US Preventive Services Task Force. *JAMA*, *321*(6), 588–601. https://doi.org/10.1001/jama.2018.20865

Ortiz Collado, M. A., Saez, M., Favrod, J., & Hatem, M. (2014). Antenatal psychosomatic programming to reduce postpartum depression risk and improve childbirth outcomes: A randomized controlled trial in Spain and France. *BMC Pregnancy and Childbirth*, *14*(1), 22. https://doi.org/10.1186/1471-2393-14-22

Putnam, S. P., Helbig, A. L., Gartstein, M. A., Rothbart, M. K., & Leerkes, E. (2014). Development and assessment of short and very short forms of the infant behavior questionnaire-revised. *Journal of Personality Assessment*, *96*(4), 445–458. https://doi.org/10.1080/00223891.2013.841171

Qin, X., Liu, C., Zhu, W., Chen, Y., & Wang, Y. (2022). Preventing Postpartum Depression in the Early Postpartum Period Using an App-Based Cognitive Behavioral Therapy Program: A Pilot Randomized Controlled Study. *International Journal of Environmental Research and Public Health*, *19*(24), Article 24. https://doi.org/10.3390/ijerph192416824

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The Development and Validation of a Structured Diagnostic Psychiatric Interview for DSM-IV and ICD-10. *The Journal of Clinical Psychiatry*, *59*(suppl 20), 11980.

Shorey, S., Ng, Y. P. M., Ng, E. D., Siew, A. L., Morelius, E., Yoong, J., & Gandhi, M. (2019). Effectiveness of a Technology-Based Supportive Educational Parenting Program on Parental Outcomes (Part 1): Randomized Controlled Trial. *Journal of Medical Internet Research*, *21*(2), e10816. https://doi.org/10.2196/10816

Slomian, J., Honvo, G., Emonts, P., Reginster, J.-Y., & Bruyère, O. (2019). Consequences of maternal postpartum depression: A systematic review of maternal and infant outcomes. *Women's Health*, *15*, 1745506519844044. https://doi.org/10.1177/1745506519844044

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Tandon, S. D., Perry, D. F., Mendelson, T., Kemp, K., & Leis, J. A. (2011). Preventing perinatal depression in low-income home visiting clients: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *79*(5), 707–712. https://doi.org/10.1037/a0024895

US Preventive Services Task Force. (2019). Interventions to Prevent Perinatal Depression: US Preventive Services Task Force Recommendation Statement. *JAMA*, *321*(6), 580–587. https://doi.org/10.1001/jama.2019.0007

Van Lieshout, R. J., Layton, H., Savoy, C. D., Brown, J. S. L., Ferro, M. A., Streiner, D. L., Bieling, P. J., Feller, A., & Hanna, S. (2021). Effect of Online 1-Day Cognitive Behavioral Therapy-Based Workshops Plus Usual Care vs Usual Care Alone for Postpartum Depression: A Randomized Clinical Trial. *JAMA Psychiatry*, *78*(11), 1200–1207. https://doi.org/10.1001/jamapsychiatry.2021.2488

Van Lieshout, R. J., Layton, H., Savoy, C. D., Xie, F., Brown, J. S. L., Huh, K., Bieling, P. J., Streiner, D. L., Ferro, M. A., & Haber-Evans, E. (2023). In-person 1-day cognitive behavioral therapy-based workshops for postpartum depression: A randomized controlled trial. *Psychological Medicine*, *53*(14), 1–11. https://doi.org/10.1017/S0033291723000454

Zhang, Y., Zhu, J., Li, S., Huang, L., Fang, Q., & Zheng, X. (2023). The effectiveness of an internet-based support program on maternal self-efficacy, postpartum depression and

social support for primiparous women during the COVID-19 pandemic: Randomized controlled trial. *Frontiers in Public Health*, *11*. https://doi.org/10.3389/fpubh.2023.1035872

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, *52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2

Zlotnick, C., Tzilos, G., Miller, I., Seifer, R., & Stout, R. (2016). Randomized controlled trial to prevent postpartum depression in mothers on public assistance. *Journal of Affective Disorders*, *189*, 263–268. https://doi.org/10.1016/j.jad.2015.09.059

Chapter 4. Discussion

4.1 Summary

This thesis aimed to evaluate the feasibility and effectiveness of an 1-day CBT-based workshop intervention delivered online for preventing PPD, as well as examining its impact on postpartum anxiety, social support, the mother-infant relationship and infant temperament. The pilot study showed that the study appeared to be feasible in terms of study design, taking into account the participant recruitment rates and the study's retention. In the RCT, after the stopping rule was implemented and the data of participants recruited up to that point were collected, we concluded that the study showed trends in reducing EPDS scores, particularly in the group with EPDS scores ≥ 7 at 2 months postpartum, with additional improvements in EPDS, GAD-7 and IBQ-R-VS scores. The studies in this thesis contribute to the existing literature on the prevention of PPD by showing the potential of 1-day psychotherapeutic workshops to prevent postpartum depression, being brief, well-tolerated, and having high participant adherence. However, further testing of this intervention's effectiveness is required.

4.2 Comparing Study 1 and Study 2

Difference in study design

The RCT's changes can be contrasted with the pilot study results, which showed statistically significant improvements in EPDS, GAD-7, PBQ-bonding, PBQ-infant focused anxiety, and IBQ-R-VS infant affectivity scores. This may be attributable to the difference in study design (between the pilot pre-post test study and the RCT). It should be noted that effect sizes in RCTs tend to be smaller compared to effect sizes in quasi-experimental study designs such as pretest-post-test designs (Bakker et al., 2019).

Psychiatrist delivery versus non-specialist delivery

Another potential key difference between Study 1 and Study 2 lies in the delivery of the intervention to participants. The pilot study's intervention was delivered by a perinatal psychiatrist, while the RCT's intervention was delivered by seven individuals with varying levels of specialization (two public health nurses, three social workers, one registered psychotherapist, and one psychiatrist). Since previous studies suggest that psychotherapeutic interventions for PPD delivered by nurses with varying levels of specialized training can reduce PPD symptoms (Dennis et al., 2020; Milgrom et al., 2011; Singla et al., 2021), it is unclear if this is the correct explanation for these differences. Additionally, the high CSQ-8 scores of both the pilot study and the RCT indicate that the participants were overall highly satisfied with the intervention whether it was delivered by a psychiatrist or a non-specialist healthcare worker.

4.3 Post-hoc Analysis – Anxiety subscale

While postpartum anxiety (PPA) was not specifically targeted during the intervention, it was acknowledged this it could have contributed to reductions seen in PPD. To determine whether the anxiety subscale of the EPDS (the EPDS-3A consisting of items 3, 4, and 5 of the EPDS) had a potential effect on the score differences between the control group and treatment group of the RCT, a post-hoc analysis was conducted in which the EPDS total scores for the treatment and control group were contrasted with the EPDS total scores of both groups with the anxiety subscale removed. This analysis showed no differences between the average EPDS total scores of both the treatment and control groups with the EPDS-3A anxiety subscale removed.

4.4 Future Directions

Given the results of the first RCT, a new RCT with a higher risk sample should be conducted (a second updated version of the RCT is currently in progress). The primary outcome and inclusion criteria for the second study have been changed, with the primary outcome now a

change of 4 or more in the EPDS score compared to baseline and an EPDS score of ≥7 as inclusion criteria and an indicator of a participant at high risk of developing PPD. App-based CBT interventions could be another focus, with new and ongoing research in the field currently testing their effectiveness (Miura et al., 2023). Finally, more accurate screening tools to identify birthing parents at risk of developing PPD should be developed. Although the risk factors of PPD are well-known and backed by research (US Preventive Services Task Force, 2019), there are currently no screening tools to consistently and effectively identify those at risk. Screening tools would also help determine which patients could benefit from preventive interventions.

4.5 Conclusion

With the impact PPD can have on birthing parents, children, and their loved ones, continued efforts should be made to develop evidence-based preventive interventions. The work presented in this thesis emphasizes the need for brief, novel and efficient interventions for preventing PPD. These studies contribute to future research in the field with the goal of preventing PPD on a larger scale to the benefit of society at large.

References

Bakker, A., Cai, J., English, L., Kaiser, G., Mesa, V., & Van Dooren, W. (2019). Beyond small, medium, or large: Points of consideration when interpreting effect sizes. *Educational Studies in Mathematics*, *102*(1), 1–8. https://doi.org/10.1007/s10649-019-09908-4

Cuijpers, P., Weitz, E., Cristea, I. A., & Twisk, J. (2017). Pre-post effect sizes should be avoided in meta-analyses. *Epidemiology and Psychiatric Sciences*, *26*(4), 364–368. https://doi.org/10.1017/S2045796016000809

Dennis, C.-L., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: Systematic review and meta-analysis. *The British Journal of Psychiatry*, *210*(5), 315–323. https://doi.org/10.1192/bjp.bp.116.187179

Dennis, C.-L., Grigoriadis, S., Zupancic, J., Kiss, A., & Ravitz, P. (2020). Telephone-based nurse-delivered interpersonal psychotherapy for postpartum depression: Nationwide randomised controlled trial. *The British Journal of Psychiatry*, *216*(4), 189–196. https://doi.org/10.1192/bjp.2019.275

Huh, K., Layton, H., Savoy, C. D., Ferro, M. A., Bieling, P. J., Hicks, A., & Lieshout, R. J. V. (2023). Online Public Health Nurse–Delivered Group Cognitive Behavioral Therapy for Postpartum Depression: A Randomized Controlled Trial During the COVID-19 Pandemic. *The Journal of Clinical Psychiatry*, *84*(5), 48096. https://doi.org/10.4088/JCP.22m14726

Karyotaki, E., Efthimiou, O., Miguel, C., Maas genannt Bermpohl, F., Furukawa, T. A., Cuijpers, P., & Individual Patient Data Meta-Analyses for Depression (IPDMA-DE) Collaboration. (2021). Internet-Based Cognitive Behavioral Therapy for Depression: A

Systematic Review and Individual Patient Data Network Meta-analysis. *JAMA Psychiatry*, *78*(4), 361–371. https://doi.org/10.1001/jamapsychiatry.2020.4364

Matthey, S. (2008). Using the Edinburgh Postnatal Depression Scale to screen for anxiety disorders. *Depression and Anxiety*, *25*(11), 926–931. https://doi.org/10.1002/da.20415

Matthey, S., Fisher, J., & Rowe, H. (2013). Using the Edinburgh postnatal depression scale to screen for anxiety disorders: Conceptual and methodological considerations. *Journal of Affective Disorders*, *146*(2), 224–230. https://doi.org/10.1016/j.jad.2012.09.009

Milgrom, J., Schembri, C., Ericksen, J., Ross, J., & Gemmill, A. W. (2011). Towards parenthood: An antenatal intervention to reduce depression, anxiety and parenting difficulties. *Journal of Affective Disorders*, *130*(3), 385–394. https://doi.org/10.1016/j.jad.2010.10.045

Miller, R. L., Pallant, J. F., & Negri, L. M. (2006). Anxiety and stress in the postpartum: Is there more to postnatal distress than depression? *BMC Psychiatry*, *6*(1), 12. https://doi.org/10.1186/1471-244X-6-12

Miura, Y., Ogawa, Y., Shibata, A., Kamijo, K., Joko, K., & Aoki, T. (2023). App-based interventions for the prevention of postpartum depression: A systematic review and meta-analysis. *BMC Pregnancy and Childbirth*, *23*(1), 441. https://doi.org/10.1186/s12884-023-05749-5

Singla, D. R., Lawson, A., Kohrt, B. A., Jung, J. W., Meng, Z., Ratjen, C., Zahedi, N., Dennis, C.-L., & Patel, V. (2021). Implementation and Effectiveness of Nonspecialist-Delivered Interventions for Perinatal Mental Health in High-Income Countries. *JAMA Psychiatry*, *78*(5), 1–12. https://doi.org/10.1001/jamapsychiatry.2020.4556

Tuohy, Alan., & McVey, Cynthia. (2008). Subscales measuring symptoms of non-specific depression, anhedonia, and anxiety in the Edinburgh Postnatal Depression Scale. *British Journal of Clinical Psychology*, *47*(2), 153–169. https://doi.org/10.1111/j.2044-8260.2008.tb00463.x

US Preventive Services Task Force. (2019). Interventions to Prevent Perinatal Depression: US Preventive Services Task Force Recommendation Statement. *JAMA*, *321*(6), 580–587. https://doi.org/10.1001/jama.2019.0007

Van Lieshout, R. J., Layton, H., Feller, A., Ferro, M. A., Biscaro, A., & Bieling, P. J. (2020). Public health nurse delivered group cognitive behavioral therapy (CBT) for postpartum depression: A pilot study. *Public Health Nursing (Boston, Mass.)*, *37*(1), 50–55. https://doi.org/10.1111/phn.12664

Van Lieshout, R. J., Layton, H., Savoy, C. D., Brown, J. S. L., Ferro, M. A., Streiner, D. L., Bieling, P. J., Feller, A., & Hanna, S. (2021). Effect of Online 1-Day Cognitive Behavioral Therapy-Based Workshops Plus Usual Care vs Usual Care Alone for Postpartum Depression: A Randomized Clinical Trial. *JAMA Psychiatry*, *78*(11), 1200–1207. https://doi.org/10.1001/jamapsychiatry.2021.2488

Van Lieshout, R. J., Layton, H., Savoy, C. D., Xie, F., Brown, J. S. L., Huh, K., Bieling, P. J., Streiner, D. L., Ferro, M. A., & Haber-Evans, E. (2023). In-person 1-day cognitive behavioral therapy-based workshops for postpartum depression: A randomized controlled trial. *Psychological Medicine*, *53*(14), 1–11. https://doi.org/10.1017/S0033291723000454