

PEER-DELIVERED TREATMENT FOR POSTPARTUM DEPRESSION

**EXAMINING CHANGES IN MATERNAL MENTAL HEALTH AND INFANT
BEHAVIOUR AFTER PEER-DELIVERED TREATMENT FOR POSTPARTUM
DEPRESSION**

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**A Thesis Submitted to the School of Graduate Studies in Partial Fulfillment of the
Requirements for the Degree Master of Science**

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TITLE: Examining Changes in Maternal Mental Health and Infant Behaviour After Peer-Delivered Treatment for Postpartum Depression

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Lay Abstract

Postpartum Depression (PPD) affects up to 20% of mothers and birthing parents and can have profound negative effects on them and their families. However, just one in ten individuals with PPD receive evidence-based treatment. The objective of this work was to determine if an online 9-week group cognitive behavioural therapy (CBT; a type of talking therapy) program delivered by mothers who have recovered from PPD (i.e., peers) can improve PPD. The results of this thesis suggest that those who received this peer-delivered intervention experienced improvements in PPD, anxiety, social support, mother-infant bonding, and infant temperament. Recovered peers can be an effective means of treating PPD, and this peer-delivery model represents a special opportunity to increase treatment uptake, foster a sense of community, and an important step toward improving PPD for mothers and their families.

Abstract

Background: Postpartum depression (PPD) affects up to 20% of mothers and birthing parents, yet only 1 in 10 receive evidence-based treatment. Left untreated, PPD increases the risk of future depressive episodes, familial disharmony, and offspring problems. This study sought to determine if an online 9-week group cognitive-behavioural therapy (CBT) intervention delivered by mothers who have recovered from postpartum depression (i.e., peers) can effectively improve PPD, anxiety, social support, the mother-infant relationship, and infant temperament in those with PPD.

Methodology: During the COVID-19 pandemic, 183 participants were randomized into experimental (received intervention at baseline plus treatment as usual (TAU)) and waitlist control (TAU plus the intervention after a 9-week wait) groups. Participants were ≥ 18 years of age, had an infant < 12 months old, were fluent in English and scored ≥ 10 on the Edinburgh Postnatal Depression Scale. Depression, anxiety, social support, mother-infant bonding, and infant behaviour were reported by all mothers at enrollment and 9-weeks later, and three months after that in the experimental group.

Results: Participants in the experimental group experienced clinically and statistically significant improvements in PPD and anxiety post-treatment and three months later. Perceptions of social support, infant-focused anxiety, and negative emotionality in infants also improved immediately post-intervention and remained stable three months later in the experimental group.

Conclusion: Online peer-delivered group CBT for PPD can effectively treat PPD and anxiety, as well as improve social support, the mother-infant relationship, and infant temperament. Online Peer-Delivered Group CBT for PPD is a novel approach to service delivery that can increase treatment uptake, providing mothers experiencing PPD with access to a credible and engaging source of help, and has the potential to revolutionize the treatment of PPD in Canada and around the world.

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List of Abbreviations

CBT	Cognitive Behavioural Therapy
CI	Confidence interval
<i>d</i>	Cohens <i>d</i>
EPDS	Edinburgh Postnatal Depression Scale
GAD-7	Generalized Anxiety Disorder Questionnaire
IBQ-R	Infant Behavior Questionnaire – Short Form Revised
IPT	Interpersonal Psychotherapy
ITT	Intent-to-treat
MDD	Major Depressive Disorder
MINI	Mini International Neuropsychiatric Interview
N	Number
OR	Odds ratio
<i>p</i>	Probability
PAI	Peer-administered intervention
PBQ	Postpartum Bonding Questionnaire
PPD	Postpartum depression
RCT	Randomized controlled trial
SD	Standard deviation
SMD	Standard mean difference
SPS	Social Provisions Scale

SPSS	Statistical Package for the Social Sciences
STAR-P	Scale to Assess Therapeutic Relationship – Patient Version
TAU	Treatment as usual
β	Unstandardized beta
\geq	Greater than or equal to

Declaration of Academic Achievement

This thesis includes one study, coordinated and written by the student. She led all formal data acquisition procedures, collected data from each participant, prepared the initial draft of the manuscript, and incorporated edits from coauthors. This work was completed between August 2020 and June 2022. Therefore, the study meets requirements for inclusion in the text. Finally, in accordance with the McMaster School of Graduate Studies requirements, the contributions made by each co-author in the study are outlined.

The study examined the effects of an online peer-delivered group cognitive behavioural therapy for postpartum depression. Peter J. Bieling, David L. Streiner, Mark A. Ferro and Ryan J. Van Lieshout were responsible for the conceptualization and design of the study. Donya Merza and Robin Brennan was responsible for screening and recruiting participants and data collection. Donya Merza and Calan Savoy analyzed the data. Dr. Van Lieshout provided guidance on data analysis and interpretation of the data. Donya Merza interpreted the findings and wrote the first draft of the manuscript, as well as approved the final manuscript as submitted. Bahar Amani, Calan Savoy, Zoryana Babiy, Peter J. Bieling, David L. Streiner and Mark A. Ferro performed critical revisions of the manuscript and provided feedback on data interpretation. Dr. Van Lieshout critically evaluated and edited the manuscript and approved the final manuscript as submitted.

I express my sincere gratitude to everyone involved with this study as their collective work facilitated the completion of this study.

Chapter 1: Introduction

Postpartum Depression

Motherhood is generally regarded as a positive experience where mothers are expected to feel fulfilled, bond with their baby effortlessly, and do it all on their own while remaining functional and happy. While many mothers and birthing parents (hereafter referred to as mothers) are happy with their new baby and roles, the birth of an infant introduces sudden and dramatic changes in duties and responsibilities which can be challenging. Such expectations can place unrealistic demands on mothers, despite the exhaustion, lack of support, grieving, and depression that some may feel after birth (Regev, 2015).

Postpartum depression (PPD), one of the most common complications of childbirth, affects up to 20% of mothers (Lanes et al., 2011). It is frequently defined as a mood disorder that occurs within one month after childbirth (Pearlstein et al., 2009); however, it can also start during pregnancy or beyond the first month of postpartum (Pearlstein et al., 2009). Postpartum depression is often marked by feelings of low mood, a lack of pleasure in activities, sleep and/or appetite disturbances, feelings of worthlessness or guilt, withdrawal from family and friends, and even suicidal ideation (American Psychiatric Association & American Psychiatric Association, 2013; U.S. Department of Health & Human Services, n.d.). These symptoms, along with increases in anxiety and irritability, adversely affect their quality of life and can even lead to alcohol and substance misuse (Chapman & Wu, 2013), relationship problems (Jones & Coast, 2013), and/or persistent depression (Vliegen et al., 2014).

Postpartum Depression and Offspring

While PPD can have many negative effects on the mother's mental health, it can also lead to cognitive, behavioural, and emotional problems in infants which can persist or even worsen through adolescence (Barry et al., 2015; Slomian et al., 2019). The mother-infant relationship has been shown to play an important role in infant development as it sets the stage for their future relationships (Bowlby, 1977). However, maternal depression can affect mothers' ability to nurture and support their families in the short- and long-term with potentially harmful consequences for their offspring. While struggling with PPD, mothers may lack emotional availability and can often display withdrawal, insensitivity, disengagement, intrusion, and hostility towards their infant (Lovejoy et al., 2000; Martins & Gaffan, 2000). Consequently, these infants are at higher risk for poorer self-regulation and heightened arousal compared with infants of mothers without PPD (Salisbury et al., 2007). This can become a vicious cycle for mothers, as these issues can make mothering and connecting with their baby even more challenging.

Chen and colleagues (2013) highlight the indirect effects of PPD on child development by showing that maternal depressive symptoms can have adverse effects on the quality of the home environment, which contributes to poorer child development. Kaplan and colleagues (2015) report that maternal insensitivity among those with PPD plays a major role in the delayed cognitive development of children, as they showed that children of clinically depressed mothers learned more poorly than the infants of non-depressed mothers. Other studies have demonstrated a significant effect of PPD

symptoms on more negative behaviours in infants including more difficult temperament (Hanington et al., 2010), less mature regulatory behaviours (Feldman et al., 2009), and internalizing problems (Bagner et al., 2010). Infants of depressed mothers also experience delayed emotional development (Slomian et al., 2019), greater negative emotionality (Feldman et al., 2009), and higher degrees of emotional disorders such as anxiety (Walker et al., 2013).

Assessment and Treatment of Postpartum Depression

Given PPD's negative effects on mothers, the mother-infant relationship, and infants' cognitive, behavioural, and emotional development, early PPD detection is key to optimal outcomes. The most widely used screening tool for PPD in clinical practice and research is the Edinburgh Postnatal Depression Scale (EPDS) (Boyd et al., 2005). The EPDS consists of 10 items and each item is scored on a 4-point scale (range, 0-3), with higher scores indicating greater severity. The scale produces a total score ranging from 0 to 30, with scores of 10 or greater indicating possible PPD (Levis et al., 2020). This tool can help identify mothers experiencing depressive symptoms after childbirth and potentially get them the help that they need.

Treating PPD in a timely manner is essential to preventing future complications for mothers and their infants. While pharmacotherapy (i.e., antidepressants) has been shown to be effective in treating PPD (Cohen et al., 2001; Stowe et al., 1995; Yonkers et al., 2008), mothers are often reluctant to take antidepressant medications due to concerns associated with breastfeeding, and out of fear of becoming 'addicted' (Boath et al., 2004).

Boath and colleagues (2004) also reported that counselling was perceived as more acceptable to mothers as a treatment for depression than antidepressants. Additionally, clinical practice guidelines recommend evidence-based psychotherapies as 1st-line treatments for the majority of women with PPD (MacQueen et al., 2016).

Psychotherapy, a form of counselling and talk therapy, is a way to help people with a variety of mental illnesses and emotional difficulties to express their personal experiences and help them conceive new ways of seeing themselves and their lives by helping them shift their thoughts, feelings, and behaviours (American Psychiatric Association, 2019). Over the years, psychotherapy has proven effective at treating many psychiatric disorders such as depression (Cuijpers et al., 2011), anxiety (Cuijpers et al., 2014), obsessive-compulsive disorder (Craighead & Craighead, 2001), panic disorder (Craighead & Craighead, 2001), and others.

While the psychotherapies can differ in the theories they are based on, most are about equally effective for depression when delivered by trained therapists (Cuijpers et al., 2011). A meta-analysis conducted by Cuijpers and colleagues (2011) also reported that psychotherapy was just as effective as pharmacotherapy in treating those with mild to moderate depression. The most common types of psychotherapy for PPD are Interpersonal Psychotherapy (IPT) and Cognitive Behavioural Therapy (CBT) (Sockol, 2015, 2018).

While IPT focuses on relieving symptoms by improving the quality of one's interpersonal relationships and social functioning (Markowitz & Weissman, 2004), CBT focuses on identifying and correcting dysfunctional beliefs and negative feelings to

reduce these emotional problems (Wenzel, 2017). Cognitive behavioural therapy is an evidence-based treatment that is based on the observation that one's thoughts (i.e., cognitions) and behaviours influence how they feel. These negative thoughts consist of general beliefs or schemas about the world, the self, and the future, producing specific automatic thoughts in particular situations (Hofmann et al., 2012). In CBT, these individuals are led to treat their beliefs as hypotheses to be tested and are guided to do so in ways that protect against the biases and distortions that they have (Hollon, 1998). Cognitive behavioural therapy uses these strategies to change these cognitions and make behavioural changes that enhance coping and reduce distress (Hollon, 1998). Cognitive behavioural therapy can range between 4-20 weeks and can last about 30 to 60 minutes per session (Cully & Teten, 2008). Over half of mothers who are treated, successfully feel better in about six to 12 sessions (American Psychological Association, 2012). Cognitive behavioural therapy for PPD may be a preferred choice as mothers have reported a preference for more formal, structured therapies that can be tailored based upon their individual needs (Pallaveshi et al., 2014).

In the perinatal period, psychotherapy is most commonly used to help mothers overcome difficulties with depression, worry and anxiety, interpersonal problems, and the transition to motherhood (Cuijpers et al., 2008) and can be delivered in individual format, in couples, or in groups. It has been shown to be an effective intervention for treating and preventing depression during the perinatal period when delivered by trained therapists (Huang et al., 2018; Sockol, 2015) and represents an effective therapeutic alternative to antidepressants (Clark et al., 2003).

Barriers to Treatment

Despite the importance of PPD treatment, mothers can face multiple barriers to access. Indeed, as few as 10% receive evidence-based care. With the high demands and busy lifestyle that accompany motherhood, mothers often struggle to find the time to travel to regular in-person treatment appointments. Mothers also struggle to attend treatments outside of their own homes because of barriers relating to childcare, transportation, and privacy. Another major challenge is a lack of knowledge about PPD. Mothers may be reluctant to seek psychological help due to the fact that they may feel alone in their symptoms of PPD as they may be unaware of the number of other mothers who experience these same symptoms (Grissette et al., 2018). Those who are interested in non-pharmacological treatments face the difficulty of long waits, prohibitively expensive private services, a relative lack of healthcare professionals with the time, knowledge, and/or experience to optimally manage perinatal mental health problems (Elkhodr et al., 2018), stigma, and the judgement of others. Researchers have found that mothers prefer to suffer in silence rather than disclose their symptoms of PPD to their significant others, family, and friends out of a fear of being judged (Henshaw et al., 2016). They also face stigma with healthcare professionals as they may not fully understand the experiences of those with PPD, leaving mothers fearful of being labelled as ill or an unfit parent (Hadfield & Wittkowski, 2017). These factors, along with concerns about being reported to child protective services (McIntosh, 1993), can make it difficult for women to share their problems openly in professional medical settings. Moreover, since referrals from

family physicians are frequently required to receive mental health care, they continue to serve as additional barriers.

The COVID-19 pandemic has not only increased the prevalence of PPD (Safi-Keykaleh et al., 2022), but has introduced additional barriers for mothers seeking treatment. These include reduced healthcare services due to the partial closure of many treatment sites, social distancing rules, and the shift of healthcare priorities within traditional and public health care systems away from maternal and child health toward direct COVID response, fear of contracting COVID-19 and passing it on to their infant and worries about outside childcare.

Peer-Administered Interventions

Peer-administered interventions (PAI) are those in which individuals are paired with individuals who are not mental health professionals but have faced similar problems (Bryan & Arkowitz, 2015). PAIs for perinatal mental health problems capitalize on the high prevalence of PPD and the fact that those without professional credentials as mental health providers (i.e., paraprofessionals) can deliver treatment effectively. In a meta-analysis, Montgomery and colleagues (2010) reported that, when providing cognitive behavioural treatment for depression and anxiety, paraprofessionals and mental health professionals achieved similar outcomes.

Regarding the effectiveness of PAIs during the perinatal period, Fang and colleagues (2022) reviewed 16 studies of peer support interventions for perinatal depression and found that these interventions improved depressive symptoms after mothers received

these treatments. They suggested that these may be an effective complement or even an alternative to existing mental health services, and could have the potential to help those with PPD overcome treatment barriers (Bryan & Arkowitz, 2015).

Peer delivery for those with mental illness may have several advantages. Peers can share similar experiences, providing an environment that is free of authority and pressure (Solomon, 2004). This may help normalize the individuals' own symptoms and reduce stigma, while encouraging them to feel more comfortable to share their own experiences. While mothers may fear judgement and stigma about what they are feeling, they perceive that those who have recovered from PPD as a credible and non-judgmental source of support because of their shared experiences and their ability to offer genuine empathy and validation (Salzer & Shear, 2002). According to Letourneau and colleagues (2007), affirmational support (i.e., validation) is better received by someone who can understand and appreciate their experiences, such as another mother who has been through PPD. Additionally, peers may be effective at retaining individuals in these programs by relating to their struggles, providing experiential knowledge, and offering solutions or advice for coping with their hardships (Aschbrenner & Brunette, 2018). By sharing mutual experiences and receiving support from a peer, individuals may be motivated to stay and feel a sense of belonging (Solomon, 2004). Given their recovery, peers can also provide hope and serve as powerful role models for current sufferers (Davidson et al., 2012).

There has been a growing interest in peer-administered interventions for perinatal depression. Dennis and colleagues (2009) conducted a study in Ontario, Canada that evaluated the effectiveness of a telephone-based peer support for the prevention of

postnatal depression. Mothers in the control group had access to standard community postpartum care, while mothers in the intervention group had access to standard community postpartum care and were matched with a trained peer volunteer to be contacted by telephone at least four times to receive support. They found that mothers who received the telephone-based peer support were less likely to have symptoms of postnatal depression and anxiety at 12 weeks than those who did not. A similar study conducted by Shorey and colleagues (2019) evaluated the effectiveness of a four-week technology-based peer-support intervention program on maternal outcomes during the early postpartum period of mothers in Singapore. After corresponding with their peer volunteer at least once a week via phone calls, emails, or mobile communication applications, they found that their peer-support intervention reduced perinatal depression among depressed and at-risk mothers at three months postpartum.

Even though PAIs in general population samples have larger effects when they use structured evidence-based treatments (Bryan & Arkowitz, 2015), these interventions used supportive interventions rather than those based on more structured, evidence-based psychotherapies. More recently, Amani and colleagues (2021) conducted a randomized controlled trial (RCT) testing the effectiveness of a peer-delivered group cognitive behavioural therapy for PPD. Participants were randomized into the intervention group, where they would immediately receive the 9-week intervention, or into the waitlist control group, to receive the intervention after a 9-week waiting period. Both groups could receive treatment as usual, and these could include psychotherapy and antidepressants. After the 9-week intervention, they reported improvements in maternal

depression, anxiety, and mother-infant bonding. However, this study contained a small sample and in a limited geographic area, questioning its validity and generalizability.

While some studies suggest that PAIs are effective in preventing and treating PPD, there are mixed results as some have reported no effect of these interventions on perinatal depression. Letourneau and colleagues (2011) tested the effectiveness of a home-based peer support program for mothers with PPD. Mothers in the intervention group received informational, emotional, affirmational, and practical support, as well as specific information about optimal maternal-infant interactions from the trained peer volunteers through home visits and/or phone calls for 12 weeks. Both intervention and control groups could also receive standard postpartum care, and the control group would receive the intervention for two weeks after a 12-week waiting period. However, no improvements in postpartum depression were observed in the intervention group. Interestingly, they found greater improvements in the control group in both depression and perceived social support at 12 weeks. Furthermore, two large RCTs examining the effectiveness of a behavioural therapy intervention delivered to mothers experiencing perinatal depression in India (Fuhr et al., 2019) and Pakistan (Sikander et al., 2019) resulted in mixed results. In India, peers delivered a Thinking Healthy Program focused on behavioural activation to pregnant mothers experiencing depressive symptoms over 7-12 months in 6-14 sessions (Fuhr et al., 2019). They reported no differences in depressive symptom severity between intervention and control groups after mothers participated in the program. Sikander and colleagues (2019) conducted the same intervention in Pakistan, where they reported modest improvements in depressive symptoms that did not

persist 6 months later. However, in both studies, peers were not necessarily recruited for having previously experienced perinatal depression, which may have impacted the effectiveness of these interventions.

Benefits of Online Therapy

The delivery of peer interventions in online settings is a newer phenomenon and could aid in making treatment available to a much larger number of mothers experiencing PPD. While research suggests that psychotherapy delivered online may be equally effective as in-person interventions (Milgrom et al., 2021; Murphy et al., 2009), others have argued that delivery in-person may be superior (Arnberg et al., 2014).

Individuals with mood and anxiety disorders rarely seek help in specialist clinics and sometimes avoid mentioning their problems to their general practitioners out of fear of judgement (Gratzer & Khalid-Khan, 2016). As internet-delivered treatments offer individuals the option to self-refer, they can provide anonymity and privacy for those who have remained untreated and make treatment seem more approachable. An online approach also provides individuals with a flexible and convenient means of treatment. For mothers with PPD specifically, it allows them to participate from home, around infant routines and childcare practices (Andersson, 2010; Pugh et al., 2015). In addition, it can increase the number of individuals who receive treatment as those in non-urban or other poorly resourced areas are able to participate from home (Andersson, 2010).

Studies concerned with the perinatal period have started to test the effects of online delivered therapies in preventing and treating maternal depression. Milgrom and

colleagues (2021) compared the efficacy of a web-based CBT intervention for postnatal depression with face-to-face CBT in a RCT. Individuals in the web-based group received six weekly sessions of self-directed CBT online plus weekly telephone coaching support to reinforce progress and encourage program use. Individuals in the face-to-face group received weekly individualized CBT therapy from an experienced psychologist. They reported that their web-based intervention was superior to the face-to-face intervention in reducing symptoms of depression, anxiety, and stress from baseline to the 21-week follow-up. These findings provide support for the potential of online delivered therapies to act as a means of treatment for mothers experiencing PPD symptoms.

Benefits of Group Therapy

Considering that social support is strongly linked to PPD onset and course (Corrigan et al., 2015), interventions delivered in groups may also be particularly beneficial. Goodman & Santangelo (Goodman & Santangelo, 2011) conducted a systematic review of group treatments for postpartum depression and reported that 10/11 studies showed statistically significant improvements in depression scores after mothers received the group treatment. Group treatment for PPD may be able to reduce feelings of isolation and loneliness in women struggling with PPD. The group approach allows participants to meet other mothers facing similar challenges, thus increasing their social networks, fostering feelings of connectedness and support, and normalizing their experiences of PPD (Goodman & Santangelo, 2011; Klier, 2006). In addition to being less resource intensive, group treatment is preferred by many women with PPD as they

greatly value the support and opportunity to learn through the modelling that it provides (Goodman & Santangelo, 2011). Additionally, online support groups have been shown to provide mothers experiencing postpartum depression a safe place to connect with others and receive information, encouragement and hope (Evans et al., 2012). Delivered in groups, peer-delivered interventions also have the potential to reduce costs, therapist time, wait times for patients, and increase the number of women that can be treated compared to one-on-one treatments (Bieling et al., 2022).

Hypothesis and Objectives

Given existing (time, travel) and new (COVID-19 concerns) barriers to receipt of evidence-based care for PPD, as well as shifts in the ways mothers and birthing parents with PPD wish to receive care, we set out to determine if a synchronous online 9-week group CBT intervention delivered by mothers who had previously recovered from PPD could effectively treat mothers currently struggling with PPD. Secondary objectives included examining its impact on maternal anxiety, social support, the mother-infant relationship, and infant temperament.

Our hypothesis is that compared with the control group, mothers in the intervention group will experience significant reductions in PPD and anxiety, and significant improvements in social support, the mother-infant relationship, and infant temperament.

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Chapter 2: Online Peer-Delivered Group Cognitive Behavioural Therapy for Postpartum Depression

Study Overview

Title: Online Peer-Delivered Group Cognitive Behavioural Therapy for Postpartum Depression

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Introduction

Postpartum depression (PPD) is one of the most common complications of childbirth, affecting up to one in five mothers and birthing parents (Lanes et al., 2011). Lack of access to effective treatment for PPD is associated with an increased risk of future depressive episodes, familial disharmony, and cognitive, emotional, and behavioural problems in offspring (Barry et al., 2015; Slomian et al., 2019). In spite of these adverse effects, just 10% of those who experience PPD in high-income countries receive evidence-based care (Bowen et al., 2012).

Despite the importance of PPD treatment, mothers and birthing parents face multiple barriers to evidence-based care. A lack of time, travel, and the need to secure childcare can be deterrents, as can long wait times and a relative lack of healthcare professionals with the time, knowledge, and/or experience to optimally manage perinatal mental health problems (Elkhodr et al., 2018). Even when there is access to these services, healthcare professionals may not fully understand the experiences of those with PPD, leaving mothers fearful of being labelled as ill or an unfit parent (Hadfield & Wittkowski, 2017). The COVID-19 pandemic has introduced additional barriers for those seeking treatment, including reduced accessibility, fears about contracting COVID and/or passing it to their infant, and worries about securing childcare.

Peer-administered interventions (PAI), those delivered by former sufferers, may be an effective complement or even an alternative to existing mental health services, and could have the potential to help those with PPD overcome treatment barriers (Bryan & Arkowitz, 2015). Such interventions capitalize on the high prevalence of PPD and the fact

that structured psychotherapies can be effectively delivered by those with a wide range of training and experience (Bickman, 1999). PAIs have the potential to increase the pool of possible providers from whom those with PPD could receive support, and offer a sense of belonging and empowerment, as well as improve feelings of self-worth (Burke et al., 2019). Those with PPD also perceive individuals who have recovered from PPD (i.e., peers) as a credible and non-judgmental source of support because of their shared experiences and their ability to offer genuine empathy and validation (Salzer & Shear, 2002). Given their recovery from PPD, peers can also provide current sufferers with valuable experiential knowledge, reduce stigma, and help establish a sense of normalcy, as well as provide hope and serve as positive role models (Davidson et al., 2012). Delivered in groups, such treatments can also potentially increase access to care, reduce isolation, and increase feelings of support (Væver, 2015).

The delivery of peer interventions online is a newer phenomenon and could help make treatment available to a much larger number of individuals, particularly those living outside of urban centres. While research suggests that psychotherapies delivered online may be equally effective as those administered in-person (Milgrom et al., 2021), others have argued that face-to-face delivery may be superior (Arnberg et al., 2014). In addition to making treatment more accessible, online treatment can provide privacy (Andersson, 2010), and make treatment more approachable. It can also provide convenience for busy mothers, allowing them to participate from home, simplifying attendance (Andersson, 2010).

Although studies of PAIs for PPD have emerged in recent years, they are not widely used in clinical practice. A recent systematic review (Fang et al., 2022) concluded that interventions involving peers could effectively reduce perinatal depressive symptoms, but only four of the nine randomised controlled trials (RCT) contained peers with actual lived PPD experience. Of these, results were mixed, and most used supportive approaches rather than those based on more structured, evidence-based psychotherapies. Two large RCTs have examined the effectiveness of a behavioural therapy intervention delivered to mothers experiencing perinatal depression in India (Fuhr et al., 2019) or Pakistan (Sikander et al., 2019), but resulted in no difference in depressive symptom change between intervention and control groups in one (Fuhr et al., 2019) and moderate improvements in the other (Sikander et al., 2019). Both trials were conducted in low- and middle-income countries, were primarily delivered one-on-one (i.e., in individual sessions), and peers were not necessarily recruited for having had past PPD. While another small Canadian RCT examining the effectiveness of a peer-delivered CBT-based intervention found that it improved PPD (Amani et al., 2021), it was delivered in-person, and was conducted in a restricted geographic area.

Given existing (time, travel) and new (COVID-19 concerns) barriers to receipt of evidence-based care for PPD, as well as shifts in the ways mothers and birthing parents with PPD wish to receive care, we set out to determine if a synchronous online 9-week group CBT intervention delivered by mothers who had previously recovered from PPD could effectively treat mothers currently struggling with PPD. Secondary objectives

included examining its impact on maternal anxiety, social support, the mother-infant relationship, and infant temperament.

Methods

Trial Design

Mothers and birthing parents were recruited from Ontario, Canada during the COVID-19 pandemic between August 25, 2020, and February 22, 2022. The study was a one-site RCT and utilized a parallel-group design with experimental and waitlist control groups. Once consent was obtained, participants were randomised in a 1:1 ratio to the online peer-delivered 9-week intervention plus treatment as usual (TAU) (experimental group) or to receive TAU and be put on a waitlist to complete the same intervention nine weeks later (waitlist control group). In Ontario, healthcare is universally available to all residents, and so TAU could involve medications, psychotherapy, and/or any other type of therapy and/or support.

Randomization with block sizes of 4, 6, and 8 were used. The randomisation scheme was created in R, version 3.5.3 (R Program for Statistical Computing) (*R-3. 5.3 for Windows (32/64 Bit)*, 2019) and implemented by the study coordinator, enabling concealment of allocation sequence until group assignment. All research assistants and the study data analyst were blinded to participant group status. Data were collected electronically using REDCap (Harris et al., 2009).

The authors assert that all procedures contributing to this work comply with the ethical standards of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS 2 (2018) and with the Helsinki Declaration of 1975, as revised

in 2008. All procedures involving human subjects/patients were approved by the Hamilton Integrated Research Ethics Board (No. 3781). All participants were assessed at enrollment (T1) and 9 weeks post-randomisation (T2). The experimental group was also assessed three months post-intervention (T3) to assess the stability of putative treatment effects. Uncertainty early in the pandemic around when in-person interventions could resume led to a delay in our registering the RCT at clinicaltrials.gov, and so 58% (107/183) of participants were enrolled by its registration (ClinicalTrials.gov ID: NCT04913584). These individuals did not differ from those enrolled after that point, and no statistical analyses were completed until after the trial was complete.

Participants

Participants were recruited through online advertising (i.e., Facebook, Instagram), community partners, healthcare providers, and self-referral. Individuals were eligible to participate if they were mothers or birthing parents ≥ 18 years old, had an infant < 12 months at recruitment, were fluent in written and spoken English, lived in Ontario, Canada, and had an Edinburgh Postnatal Depression Scale (EPDS) score of ≥ 10 . Participants were excluded if they had bipolar, psychotic, current substance misuse (as per the Mini-International Neuropsychiatric Interview (MINI)) (Sheehan et al., 1998) and/or borderline personality disorders (as per the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) (American Psychiatric Association & American Psychiatric Association, 2013). Written informed consent was obtained from all subjects/patients.

Intervention

The 9-week synchronous, online peer-delivered CBT intervention was based on a previously developed and validated intervention (Van Lieshout et al., 2017). Participants completed one two-hour session each week, which were led by two peer facilitators via the online video conferencing platform Zoom. The first half of each session involved teaching and practice of core CBT skills, followed by one-hour of unstructured discussion on topics relevant to those with PPD (e.g., life transitions, anxiety, sleep, supports). Core cognitive skills (e.g., cognitive restructuring) were introduced and practiced from week one. Behavioural techniques (i.e., behavioural activation, relaxation techniques, goal setting) were introduced in week two and continued throughout the program. The sessions were recorded and sent to an expert psychiatrist for review after each session, and one hour of psychotherapy supervision was provided by the psychiatrist to each peer facilitator pair weekly.

Peer Facilitator Recruitment/Training

Peer facilitators were recruited through social media advertisements and were eligible if they scored below clinical cut-offs for the Beck Depression Inventory-II (<14) and the Generalized Anxiety Disorder-7 (GAD-7) (<10) at the time of recruitment. Five peers who had recovered from PPD were selected after completing a written application and telephone interview.

Peer facilitators underwent a three-day training program for individuals with little or no prior psychiatric training that consisted of didactic teaching, practice, and role plays

delivered by an experienced perinatal psychiatrist. Peers then observed the 9-week intervention delivered by experts, and then delivered the intervention online in pairs. Individual peers were randomly assigned to lead groups.

Outcome Measures

The characteristics of all participants were self-reported, including our primary (PPD) and secondary outcomes (anxiety, social support, the mother-infant relationship, and infant temperament). Participants in the experimental and control groups provided data on all measures at T1 and T2. The experimental group also provided data on these measures at T3. After completing the intervention experimental participants provided their perceptions of the therapeutic relationship between them and the peer facilitators.

Postpartum depression symptom severity was assessed using the (EPDS), a 10-item self-report scale measuring the frequency and severity of depressive symptoms in mothers during the postpartum period. It is the most widely used depression screening tool in perinatal care (Levis et al., 2020). The MINI was also administered to examine change in current major depressive disorder (MDD) diagnosis from T1 to T2.

Secondary outcomes included anxiety measured using the (GAD-7), a well validated seven-item self-report scale that measures symptoms of generalized anxiety disorder, the most common comorbidity of PPD (Spitzer et al., 2006).

Social support was assessed using the Social Provisions Scale (SPS), a 24-item self-report measure of the degree to which the individuals in one's life provide support

(Cutrona & Russel, 1987). Total scores were used, with higher scores indicating better perceived support.

The mother-infant relationship was assessed using the Postpartum Bonding Questionnaire (PBQ), a 25-item measure of disorders of the mother-infant relationship. It contains four subscales: impaired bonding, rejection and pathological anger, infant-focused anxiety, and incipient abuse (Brockington et al., 2006). The incipient abuse subscale was not used in this study due to its low sensitivity (Brockington et al., 2006).

Infant temperament was measured using the Infant Behavior Questionnaire-Revised (IBQ-R) (Short-Form), a 91-item measure that assesses infant temperament based on maternal observations of infant affect and behaviour (Putnam et al., 2014). It contains three factors: positive affectivity/surgency, negative emotionality, and orienting/regulatory capacity.

Finally, the Scale to Assess Therapeutic Relationship-Patient (STAR-P; a 12-item measure used to assess the nature of therapeutic relationships) was completed by participants assigned to the experimental group to examine the degree of collaboration between participants and peers (McGuire-Snieckus et al., 2007).

No changes were made to the study methods or trial outcomes after trial commencement. The trial ended once the estimated sample size was reached.

Sample Size and Statistical Analysis

A priori sample size estimates suggested that at $n=174$ women must be recruited to the study to detect a treatment effect size of $d=0.5$ at $\alpha=0.05$, $1-\beta=0.80$, employing a first autoregressive covariance structure. This estimate also considered an attrition rate of

35% in keeping with previously observed loss to follow-up in earlier studies (Amani et al., 2021; Bryan & Arkowitz, 2015; Fang et al., 2022).

t-tests and chi-square tests were used to compare demographic differences between the experimental and control groups. We also examined predictors of attrition to assess potential demographic differences between those who completed the study versus those who dropped out prior to study completion.

This study utilized an intent-to-treat (ITT) approach to analysis that utilized participant data regardless of protocol deviation, treatment non-compliance or withdrawal following randomisation, producing a more conservative estimation of treatment effect than complete-case analysis. In keeping with ITT, all follow-up data were analyzed according to participant randomisation at the outset of the study.

Continuous outcomes were analyzed using linear mixed models employing restricted maximum likelihood estimation. This model utilized a two-level hierarchy in which outcomes at the three study timepoints (T1-Baseline, T2-Post Treatment, T3-Follow-up) (level 1) were nested within individual participants (level 2). Group assignment was included as a fixed-effect predictor allowing us to investigate the effect of the intervention over the course of the study between experimental and control groups. Time was specified as a fixed effect (repeated measures) predictor, and these models included a group-by-time interaction term to assess the treatment effect of the intervention from baseline and between groups. A random-effects intercept was included to adjust for unobserved heterogeneity at the level of the individual participants and for clustering effects. Cohen d was computed using the estimated marginal means of

continuous scale scores at T1 and T2 to quantify the effect size of the intervention within the experimental group (independent of the control group).

Dichotomous outcomes were analyzed using generalized estimating equations with a binomial logit-link function and first order autoregressive covariance structure to estimate odds ratios between groups at each timepoint. Analyses were conducted using SPSS Statistics 28 (SPSS Statistics, IBM Corporation) (IBM Corp, 2019).

To investigate the effect of current MDD diagnosis, medication use, and previous psychotherapy use of participants on treatment effect, three moderator analysis was performed. The outcome variable for analysis was EPDS score. The predictor variable for the analysis was time. The moderator variables were current MDD diagnosis, medication use, and previous psychotherapy use.

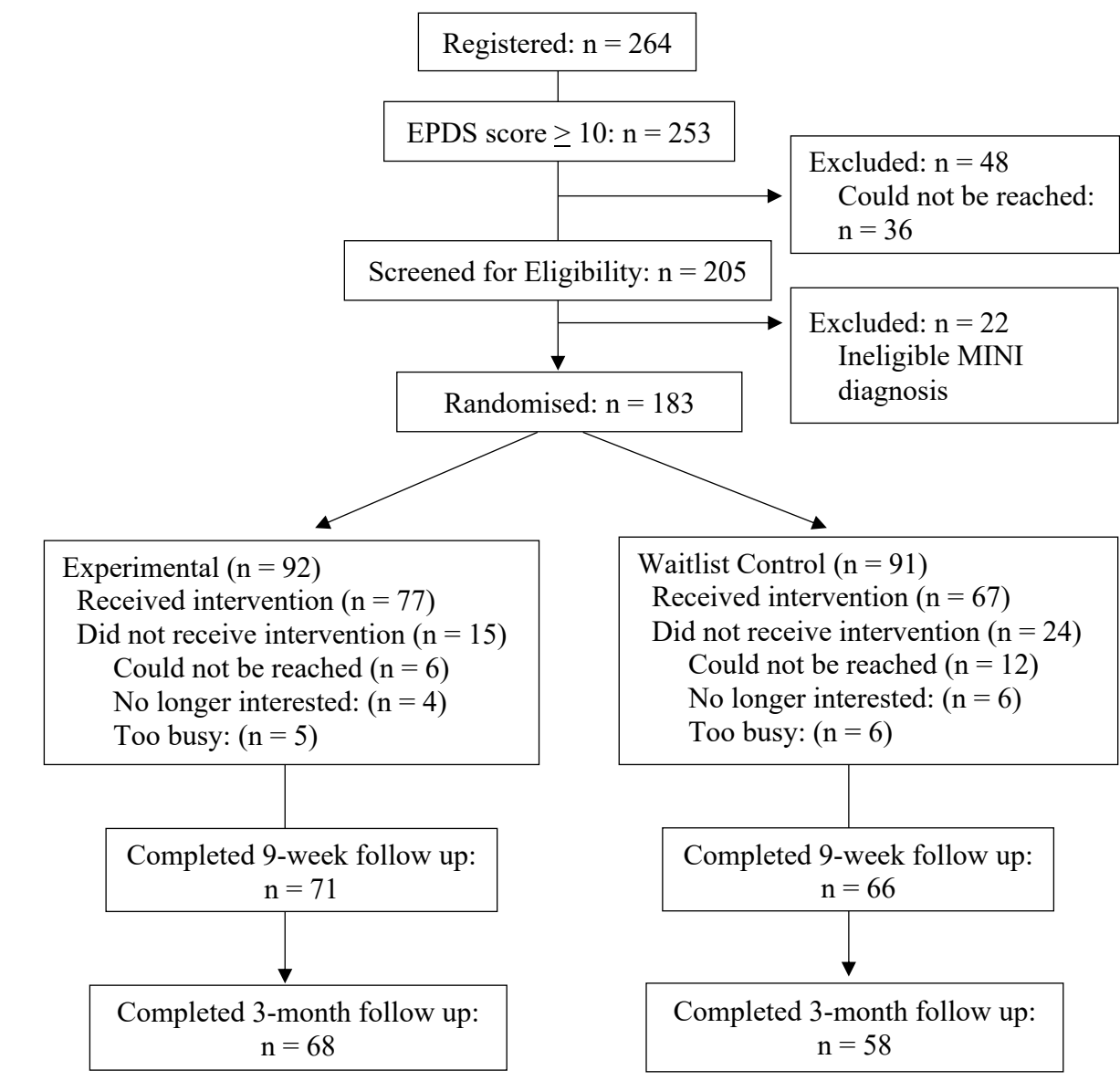
Results

Of the 264 participants screened, 183 met eligibility criteria and were recruited to be randomised to experimental (n=92) or to waitlist control (n=91) groups (Figure 1). One hundred sixty-three participants (89%) provided data at T1 and 137 (75%) at T2. Sixty-eight (74%) participants in the experimental group provided complete data at T3.

Baseline characteristics of participants are summarized in Table 1. The mean (SD) age of study participants was 31.7 (4.8) years, and their infants were 4.6 (3.0) months old at enrollment. Most participants (n=169, 93%) were either married or living common law, and 129 (79%) were white. Forty-one (25%) were taking antidepressant medications at enrollment and 65 (40%) had received counseling in the past.

Seventy-seven percent of participants (125/163) attended ≥ 5 of their 9 weekly sessions. Fourteen groups were delivered, with a mean of 11 participants assigned to each group. Peer facilitators were between the ages of 32 and 57 years old at the time of recruitment and held a wide range of occupations (e.g., administrative assistant, early childhood educator, doula).

Figure 1. Flowchart of Trial Participants



EPDS = Edinburgh Postnatal Depression Scale, MINI = Mini International Neuropsychiatric Interview

All participant demographic and clinical characteristics were examined as potential factors associated with attrition. Household income (\$99 507 vs \$79 192; $t_{183}=2.28$; $P=.024$) and years of education (14.19 vs 15.37; $t_{183}=3.94$; $P<.001$) differed between those who completed the T2 and those who were lost to follow-up prior to T2. Younger age (26.67 vs 32.16; $t_{71}=2.08$; $P=.042$) and lower household income (\$55 000 vs \$102 867; $t_{71}=2.03$; $P=.047$) were associated with attrition between T2 and T3 among those in the experimental group. From T1 to T2 there were no changes in psychotropic medication use and the number of mental health care visits in the experimental and control groups.

Table 1. Baseline Characteristics of Study Participants

Characteristics	Experimental Group (n = 92)	Waitlist Control Group (n = 91)
Maternal age, y	31.7 (4.7)	31.6 (4.9)
Household Income, \$CAD ^b	101,104 (40,488)	90,863 (43,514)
Marital Status, n/total n (%)		
Single	4/91 (4.4)	8/90 (8.9)
Married/common-law	87/91 (95.6)	82/90 (90.1)
Infant age, months	4.7 (3.1)	4.5 (2.9)
Infant sex, male, n/total n (%)	39/84 (46.4)	46/76 (60.5)
Ethnicity, n/total n (%)		
White	71/86 (82.6)	58/77 (75.3)
Non-White	15/86 (17.4)	19/77 (24.7)
Total Children, n/total n (%)		
One Child	48/85 (56.5)	31/72 (43.1)

More than 1 child	37/85 (43.5)	41/71 (57.7)
Education, years	15.2 (1.5)	15.1 (1.4)
Prior use of counselling, n/total n (%)	34/86 (39.5)	31/77 (40.2)
Current psychotropic medication use, n/total n (%)	21/86 (24.4)	20/77 (26.0)
Current major depressive disorder (MINI), yes, n/total n (%)	59/92 (64.1)	59/90 (65.6)
Any MINI Diagnoses, n (%)	82/92 (89.1)	79/90 (87.8)

^aValues are shown as mean (SD) unless otherwise noted. Data were missing for variables for which total n values shown are less than 92 (experimental group) and 91 (waitlist control group).

^bYearly, before tax.

*Abbreviations: MINI = Mini International Neuropsychiatric Interview.

A statistically significant group-by-time interaction between T1 and T2 predicted change in EPDS (B=3.32 [0.89]; P<.001), GAD-7 (B=3.60 [0.93]; P<.001), and SPS scores (B=-3.37 [1.48]; P=.023), as well as for PBQ infant-focused anxiety (B=1.07 [1.07]; P=.017), and IBQ-R negative emotionality (B=0.45 [0.15]; P=.004) (Table 2).

Table 2. Interaction Term of Group x Time Between T1 and T2

Outcome Measure	B	Std. Error	df	t	P
EPDS	3.32	0.89	269.71	3.62	< .001 ^a
GAD	3.60	0.93	267.31	3.88	< .001 ^a
SPS Total	-3.37	1.48	263.54	-2.28	0.023 ^a
PBQ-IB	1.55	0.95	260.95	1.63	0.104
PBQ-RPA	0.78	0.65	258.83	1.21	0.228
PBQ-IFA	1.07	0.45	257.43	2.40	0.017 ^a
IBQ-R-SUR	0.00	0.14	249.73	-0.03	0.977
IBQ-R-NEG	0.45	0.15	260.54	2.93	.004 ^a

IBQ-R-REG	-0.06	0.13	259.79	-0.48	0.634
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Abbreviations: EPDS = Edinburgh Postnatal Depression Scale, GAD-7 = 7 item Generalized Anxiety Disorder scale, IB = Impaired Bonding, IBQ-R = Infant Behavior Questionnaire Revised, IFA = Infant-Focused Anxiety, NEG = Negative Affectivity, PBQ = Postpartum Bonding Questionnaire, REG = Orienting/Regulation, RPA = Rejection and Pathological Anger, SPS = Social Provisions Scale, SUR = Surgency
^aStatistically significant (P < .05)

After stratifying by intervention group (Table 3), experimental group participant EPDS scores decreased from 16.19 (4.71) at T1 to 10.20 (4.32) at T2 (B=-5.99; P<.001; *d*=1.32) and were stable through T3 (B=0.02; P=0.977). Experimental group participants also had 11 times the odds of no longer meeting diagnostic criteria for current major depressive disorder at T2 relative to control participants (OR=11.55; 95% CI, 3.53 to 37.77).

Mean (SD) GAD-7 scores decreased from 12.95 (5.05) at T1 to 7.01 (4.66) (B=-5.94; P<.001; *d*=1.22) at T2 and were stable at T3 (B=-0.01; P=0.977). Those in the experimental group also had nearly five times the odds of no longer meeting diagnostic criteria for Generalized Anxiety Disorder at T2 relative to control participants (OR=4.78; 95% CI, 1.93 to 11.82).

The SPS scores of mothers increased after the intervention (B=4.00; P=.001; *d*=0.40) while infant-focused anxiety (B=-1.61; P<.001; *d*=0.54) in mothers and birthing parents, and negative emotionality (B=-0.23; P=.041; *d*=0.23) decreased in infants. SPS scores (B=-0.56; P=0.630), infant-focused anxiety (B=-0.34; P=0.152), and negative emotionality (B=0.16; P=0.093) were also stable from T2 to T3.

There were no statistically significant group-by-time interactions to predict PBQ-impaired bonding or rejection and pathological anger subscales from T1 to T2.

The high STAR-P scores collected following treatment also suggested that participants experienced a high degree of positive collaboration with their peer facilitators (mean [SD]=20.39 [3.51], total score=24) as well as high levels of positive peer facilitator input, reflecting the extent to which participants felt encouraged, regarded, supported, heard, and understood (9.73 [1.90], total score=12). Participants also described low levels of non-supportive peer facilitator input (10.34 [2.54], total score=12).

Based on our moderation analysis, we found that a diagnosis of current MDD at baseline (B=2.68; P=0.112; 95% CI=-0.63 to 5.99), the use of psychotropic medication at baseline (B=-0.88; P=0.635; 95% CI=-4.54 to 2.78), and having received therapy in the past (B=-3.06; P=0.060; 95% CI=-6.25 to 0.13) had no significant moderation effect on EPDS score from T1 to T2.

Table 3. Changes from T1 to T2 in Primary and Secondary Outcomes

Outcome	Experimental Group (n = 92)			Waitlist Control Group (n = 91)		
	T1 Mean (SD)	T2 Mean (SD)	Δ Mean (95% CI)	T1 Mean (SD)	T2 Mean (SD)	Δ Mean (95% CI)
EPDS Score ^a	16.19 (4.71)	10.20 (4.32)	-5.99 (-7.13 to -4.85)	15.79 (4.51)	13.96 (4.90)	-1.83 (- 2.94 to - 0.73)
GAD-7 Score ^a	12.95 (5.05)	7.01 (4.66)	-5.94 (-7.01 to -4.79)	11.88 (5.41)	10.41 (5.61)	-1.51 (- 2.72 to - 0.31)
SPS Score ^a	76.26 (10.77)	80.22 (8.82)	4.00 (1.64 to 6.36)	77.21 (11.43)	77.73 (10.86)	0.45 (-1.21 to 2.13)
PBQ Score						
IB subscale	13.44 (7.38)	9.39 (6.23)	-4.05 (-5.30 to -2.80)	11.94 (7.14)	11.07 (7.35)	-0.92 (- 2.22 to 0.39)
RPA subscale	6.93 (5.07)	5.16 (4.04)	-1.76 (-2.67 to -0.85)	5.61 (5.26)	5.10 (5.18)	0.55 (-1.38 to 0.28)

IFA subscale ^a	5.56 (3.21)	3.94 (2.71)	-1.61 (-2.16 to -1.05)	4.68 (3.36)	4.37 (2.81)	-0.28 (- 1.02 to 0.46)
IBQ-R Score						
SUR subscale	4.44 (1.13)	4.90 (0.78)	0.46 (0.26 to 0.65)	4.53 (1.03)	4.93 (0.72)	0.40 (0.22 to 0.59)
NEG subscale ^a	3.73 (1.05)	3.50 (0.91)	-0.03 (-0.20 to 0.14)	3.63 (1.05)	3.71 (0.94)	0.05 (-0.13 to 0.23)
REG subscale	5.09 (0.78)	5.06 (0.72)	-0.23 (-0.45 to -0.01)	5.10 (0.75)	5.16 (0.62)	0.07 (-0.12 to 0.26)

Abbreviations: EPDS = Edinburgh Postnatal Depression Scale, GAD-7 = 7-item Generalized Anxiety Disorder scale, IB = Impaired Bonding, IBQ-R = Infant Behavior Questionnaire-Revised, IFA = Infant-Focused Anxiety, NEG = Negative Affectivity, PBQ = Postpartum Bonding Questionnaire, REG = Orienting/Regulation, RPA = Rejection and Pathological Anger, SPS = Social Provisions Scale, SUR = Surgency.

^aStatistically significant ($P < .05$) mean difference and group \times time interaction.

Discussion

The findings of this study suggest that mothers who have previously recovered from PPD (i.e., peers) can deliver effective online group CBT to mothers currently struggling with PPD. Mothers and birthing parents who received the intervention displayed statistically and clinically significant improvements in depression and anxiety, as well as improvements in social support, infant-focused anxiety, and in their infant's negative emotionality. These improvements persisted up to three months post-intervention, highlighting the potential stability of these effects.

To our knowledge, this is the first study where lay peers have delivered a structured psychotherapy online in group format. The size of the clinical effects of this intervention on PPD are comparable to previous treatment trials of CBT delivered in-person by professionals (Sockol, 2015), and appear to be larger than previous PAIs for

PPD (Fang et al., 2022). It is possible that the use of an evidence-based, structured psychotherapy contributed to this latter finding. The presence of expert psychotherapy supervision may also have played a role in the magnitude of the improvements seen. Regardless, past studies have suggested that structured interventions may be more effective than support groups (Bryan & Arkowitz, 2015). The delivery of the CBT intervention by peers may also play an important role in its therapeutic effects since studies have found that people with a history of depression may be more effective at supporting depressed adults, than those without (Colineau & Paris, 2010). Indeed, STAR-P ratings suggest that peers can provide a space for mutual openness and trust where those with PPD can feel understood, supported, and encouraged.

Although there is limited research on the effectiveness of PPD interventions on anxiety in the perinatal period, we observed substantial improvements in this outcome with online peer-delivered group CBT for PPD. The fact that CBT has been shown to be effective in treating anxiety (Beck, 1993) could contribute to these results, as could changes in social support, infant-focused anxiety and/or infant temperament.

While findings on changes in social support with PPD treatment have been mixed, our study suggest that online peer-led CBT can lead to significant improvements. While the COVID-19 pandemic may have forced some mothers to isolate themselves from their support networks, the relationships and sense of community that the group and its peer leaders provided could have contributed to the increase in perceived support seen.

Although the intervention did not produce any changes in the mother-infant relationship in the way of impaired bonding or rejection and pathological anger, it did

appear to reduce infant-focused anxiety. Studies have shown that mothers and birthing parents who feel cared for during the perinatal period are less likely to be negatively affected by stressful events (Stapleton et al., 2012). Participants' increased perception of social supports, together with the skills that CBT provided them when dealing with negative thoughts and behaviours may have enabled them to cope with these anxieties better, even during the COVID-19 pandemic.

Finally, online peer-delivered group CBT led to a small effect size improvement in negative emotionality in infants. While mother-infant synchrony can promote offspring ability to manage negative emotions, individuals with PPD can struggle with reduced synchrony in their interactions with their infants (Granat et al., 2017). Accordingly, it may be that the reductions in depressive (and/or anxiety) symptoms helped to enhance mother-infant interactions and led to reduced negative emotionality among infants.

Our study found that current MDD diagnosis did not play a role on treatment effect from T1 to T2. This finding demonstrates that our peer-delivered intervention was effective in treating PPD, regardless of participant diagnosis (current MDD or no current MDD). This can be explained by the fact that CBT interventions have efficacy in treating MDD (Sockol et al., 2011) and that, while some argue that depression occurring in the early postpartum period may be distinct from MDD (Batt et al., 2020), our study involved unstructured discussion on topics relevant to those with PPD. The structured approach of the intervention, together with the lessons covered on PPD, may have enabled both those with current MDD and those without to improve.

Our study also found that psychotropic medication did not play a role on treatment effect from T1 to T2. This could be because medication may not contribute further improvements in PPD when used alongside psychotherapy. A study conducted by Bloch and colleagues (2012) found that treatment groups receiving a brief 8-week dynamic psychotherapy did not demonstrate a significant benefit for sertraline over placebo as an add-on treatment in mild-to-moderate postpartum depression. Our findings are consistent with this study which demonstrate that the use of psychotropic medications adjunct an intervention may not suggest further improvements in PPD. However, it may have been that we did not have enough power to detect true effects as the sample size of individuals who were taking medications was small (n=41).

Furthermore, our results demonstrate that having previously received therapy did not affect treatment outcomes between groups over time. This may be because the previous therapy that participants received may not have been targeted towards maternal depression and therefore not relevant when dealing with PPD. A qualitative conducted by O'Mahen and colleagues (2012) suggests that CBT should be modified to improve relevance for perinatal depression to improve outcomes. However, it may also have been that we did not have enough power to detect true effects as the sample size of individuals who had previously received therapy was small (n=65).

Despite the effectiveness of this online peer-delivered group CBT for PPD, the limitations of this study should also be noted. First, our sample consisted mainly of white, married mothers living in a high-income country where healthcare is universally available, and so may limit generalisability of our results. However, the

sociodemographic characteristics of our participants are similar to those of other PAIs that have been conducted in high-income countries (Fang et al., 2022). Moreover, our trial also used a waitlist control group in which participants still received peer-led CBT after a nine-week waiting period, and this could have inflated the size of the effects of the intervention. However, this design was chosen over TAU alone as we did not want to deny access to the intervention during the COVID-19 pandemic. It was also only possible to assess the stability of the effects of the intervention in the experimental group, and it was just three months in duration. While the peer facilitators received weekly psychotherapy supervision where fidelity to the treatment was supported, we did not formally assess psychotherapy fidelity. As a result, it is not clear what components of the intervention contributed to the clinical improvements we observed (e.g., was it the use of CBT skills, the therapeutic alliance between participants and peer facilitators, and/or other factors). Given that the second half of the sessions was an open discussion and that some mothers had connected socially with other group members after the intervention, these interactions may have contributed to some of the improvements seen in the mothers' clinical symptoms. While the SPS measures the degree to which the individuals in one's life provide support, we did not formally assess the perceived support they received within the group.

Future studies should examine the stability of intervention effects over longer periods of follow-up (e.g., six months), formally assess psychotherapy fidelity, and seek to determine if peers can continue to deliver the intervention effectively in the absence of regular expert supervision (or provide effective feedback to one another). Moreover,

exploring the mechanisms by which peer-delivered group CBT for PPD exerts its effects could provide important insights into the effective ingredients of this intervention.

Overall, our results are consistent with those in a systematic review that suggests that peer-administered interventions can be an effective means of managing perinatal depression (Fang et al., 2022). This study is also one of the few published RCTs treating depression during the COVID-19 pandemic, utilised an online video platform as a means of delivery, and had mothers who have recovered from PPD delivering the treatment. While our previous peer-delivered CBT study used a similar design (19), this trial was delivered online, had a significantly larger sample size, and recruited mothers from a much broader geographic area. Due to the unique nature of this trial, it contributes significantly to the field of postpartum depression research.

Given the large number of mothers and birthing parents affected by PPD, its detrimental effects on them and their offspring, the substantial barriers they face to accessing evidence-based psychotherapies, and changes in the ways these individuals want to access treatment, innovative approaches to treating these individuals are urgently needed. Online peer-delivered group CBT for PPD may could contribute to improving access to treatment by complementing existing services in traditional healthcare systems and providing an online avenue that expands its ability to reach more mothers and birthing parents. Recovered peers are not only plentiful but may be seen as more approachable than healthcare professionals and can provide a sense of community and safety. Online peer-delivered group CBT for PPD may have the potential to reach and

effectively treat mothers and birthing parents, improving outcomes for them, their families, and society.

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Chapter 3: Discussion

Summary

While PPD is a major public health concern that affects mothers and their infants, existing barriers can prevent them from receiving the treatment that they need. Peer-administered interventions can potentially help overcome these barriers and improve symptoms, quality of life, and the mother-infant relationship. The objective of this thesis was to determine the effectiveness of an online 9-week peer-delivered group CBT for PPD on improving maternal depression and its comorbidities.

The findings of the study suggest that mothers who have previously recovered from PPD can deliver effective online group CBT to mothers currently struggling with PPD. Mothers who participated in the 9-week peer-delivered intervention displayed statistically and clinically significant improvements in depression and anxiety, as well as statistically significant improvements in perceived social support, infant-focused anxiety, and their infant's negative emotionality. There was a sustained improvement on these measures at three months after the intervention, suggestive of the potential stability of these effects.

Interpretations

A large body of research has been devoted to better understanding the effects of peer-administered interventions on maternal PPD. In a systematic review on the effect of peer support interventions on perinatal depression, Fang and colleagues (2022) report that compared with the control measures, peer support had a statistically significant beneficial

effect on perinatal depression with a small effect size (SMD = -0.39, 95% CI (-0.54, -0.24), $P < 0.00001$, $I^2 = 78\%$). After conducting a subgroup analysis that focused on the seven studies on peer support received *postpartum*, they reported improvements in the depression of mothers of medium effect size (SMD= -0.51, 95% CI (-0.93, -0.09), $P = 0.02$). Our intervention was also effective, but its effect size was larger (Cohens $d = 1.32$). This may be due to the fact that our study utilized a structured and evidence-based psychotherapy rather than an unstructured and non-specific support group, which allows providers to use research-driven interventions rather than relying on facilitator opinion (Cook et al., 2017). This is consistent with the finding that studies examining the impact of PAIs for depression in general population samples have the biggest impact if they are structured and utilize evidence-based treatments (e.g., CBT) (Bryan & Arkowitz, 2015).

When Fang and colleagues (2022) conducted a subgroup analysis of five studies that provided peer support in group format (SMD = -0.19, 95% CI (-0.40, 0.02), $P = 0.08$), they found that peer support interventions had no effect on perinatal depression. However, other existing research has shown that PAIs delivered in groups are able to reduce symptoms of depression (Amani et al., 2021; Morgan et al., 1997). Nonetheless, three of the five group intervention studies provided shorter-term interventions than the one presented in this thesis. One of the studies conducted by Field and colleagues (2013), comparing the effects of peer support and interpersonal psychotherapy groups on prenatal depression, only designated 20-minute sessions once per week for 12 weeks. Chibanda and colleagues' (2014) study, examining the efficacy of group problem-solving therapy delivered by peer counselors versus pharmacotherapy for postnatal depression of

postpartum HIV-infected and uninfected mothers in Zimbabwe, only provided the intervention for 6 weeks, consisting of two 60-minute sessions a week. Lastly, Chen and colleagues (2000), who examined the effects of a support group intervention in postnatally distressed mothers in Taiwan, did not use peer leaders and consisted of only four weekly sessions, each of 1.5-2 hours duration. It could be that these group sessions in this systematic review were not able to meet the limited time requirements of some mothers and therefore group sessions may require more time and longer lengths of sessions to meet the needs of all the mothers in the group. Our intervention provided two hours of treatment for nine weeks and therefore the mothers in our group may have had more time and opportunities to benefit from the intervention.

Future Steps for Peer-Administered Group CBT

Future research should be conducted to further examine the treatment effects of online peer-delivered group CBT for PPD. Critical steps forward could be made by i) advancing the study design, ii) using a more diverse sample to assess its generalizability, iii) conducting further research to understand the mechanisms involved in the studies effectiveness, and iv) attempting to scale the study.

Researchers should first replicate and extend upon the findings presented in this thesis with more advanced study designs. For example, given the findings of the present study and what is typically needed for interventions to be translated into clinical practice, future studies should examine the stability of intervention effects over longer periods of follow-up (e.g., six months). Additionally, future studies examining the effects of treating

PPD could also benefit from other experimental designs. For example, studies could use a “no-treatment” control group (while being able to receive treatment as usual) to determine the effect sizes compared to our waitlist control group. While our use of a waitlist control group could have inflated the size of the effects of the intervention, a “no-treatment” group might be able to provide a more accurate representation.

Second, future studies should make attempts to diversify their sample to produce more generalizable outcomes. Researchers should examine possibilities of upscaling the intervention by studying its effects on individuals of lower socioeconomic status and different racial and ethnic groups to determine for whom the intervention may work best for. Low socioeconomic status has been reported to be associated with increased depressive symptoms (Goyal et al., 2010; O’Hara & Swain, 1996) and therefore these individuals may benefit greatly from this intervention. Additionally, many racial and ethnic disparities in the initiation and continuation of postpartum depression care exist (Kozhimannil et al., 2011) and therefore it could be helpful to determine if this intervention is effective for those individuals to serve as a means of treatment for them. Additionally, while our study excluded participants if they had bipolar, psychotic, current substance misuse and/or borderline personality disorders as per the MINI, future studies should consider these factors.

Third, it would be interesting to further investigate the mechanisms by which peer-delivered group interventions might lead to improvements in maternal PPD and its comorbidities. For example, large randomized controlled trials could include measures that examine participants’ ratings of their use of intervention skills, their perceptions of

their alliance with the peer leaders, the extent to which the specific involvement of recovered peers lead to treatment effects, and group cohesion. Moreover, understanding the experiences and perceptions of mothers enrolling and engaging in online peer-administered group CBT for PPD would allow for a greater understanding of the effects of this intervention and why mothers select it. Additionally, a qualitative approach that focuses on the perspective of the participants in the intervention could reveal information about their lived experiences, provide narratives, gather in-depth insights about their involvement, and obtain an accurate understanding of the advantages experienced by the users; information that does not come through with a quantitative approach. This approach provides rich and detailed results that can contribute to better understanding how and why the intervention succeeded.

Lastly, future research should attempt to determine ways to increase performance and costs to increase its scalability. Researchers could formally assess psychotherapy fidelity to examine its contribution to effectiveness and to begin to establish the reproducibility of the findings across different peers and settings. For example, adherence to the intervention and competence with which the intervention is developed, by the peers, can be measured, as intervention fidelity is generally assessed with these measures (Blackburn et al., 2001). Adherence refers to the degree to which a peer leader is consistent with the intervention manual when applying techniques; competence is the level of skill and judgment that a peer leader demonstrates when delivering the intervention (Hepner et al., 2011). Singla and colleagues (2020) examined the ability of lay peers to supervise and evaluate other peers as reliably as experts through a trial for

perinatal depression in India. They reported that with time, non-specialist or lay providers can be trained to implement peer supervision and assess therapy quality as reliably as experts. However, peers were not necessarily recruited for having recovered from PPD. To maximize the scalability and cost-effectiveness of our intervention, future studies should seek to determine if peers with lived experiences can deliver this intervention effectively in the absence of regular expert supervision. One potential approach could involve weekly guided feedback sessions (i.e., supervision) led by the peers to provide effective feedback to one another. Weekly session checklists, adherence checklists, and competence checklists are tools that can be utilized by the peers to guide their feedback sessions. Moreover, researchers could determine the optimal method of delivery for peer delivered intervention (e.g., in-person vs online).

Finally, effective knowledge translation plans must be developed and implemented to make a substantial impact. It is essential that perinatal mental health researchers effectively communicate their evidence in research settings and to health care providers and policy makers for this evidence to have a lasting impact on mothers, families, and society.

Conclusions

Postpartum depression is a major mental health problem and taking the right steps to treating it is imperative. Understanding the needs and preferences of mothers struggling with PPD, as well as the barriers that they face when receiving treatment, is important when determining the right treatment for them. An intervention that is

effective, easily accessible, engaging, evidence-based, and provides a sense of community where they feel heard and understood is imperative to the large number of mothers and birthing parents affected by PPD. Online peer-delivered group CBT for PPD may be this contribution, improving access to treatment by complementing existing services in traditional healthcare systems. Recovered peers are not only plentiful, but may be more approachable than healthcare professionals, and can provide a sense of community and safety. The work presented in this thesis highlights the importance and potential of peers as effective delivery agents of PPD treatment for mothers currently struggling with PPD. Given that this intervention may be capable of treating mothers with PPD, it has the potential to reach those who would otherwise not receive treatment, significantly improving outcomes for them, their families, and society.

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