BRIEF PEER-DELIVERED TREATMENT FOR POSTPARTUM DEPRESSION

EVALUATING THE EFFECTIVENESS OF ONLINE 1-DAY PEER-DELIVERED CBT-BASED WORKSHOPS FOR POSTPARTUM DEPRESSION

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Lay Abstract

Postpartum depression (PPD) affects up to 1 in 5 mothers and birthing parents and has short and long-term impacts on them and their infants. Due to various treatment barriers including stigma, costs, and long waitlists, only 1 in 10 of those with PPD receive treatment. This thesis aimed to investigate the effectiveness of an online peer-delivered 1-day cognitive behavioural therapy (CBT)-based intervention in treating PPD and its common comorbidities and complications. The results suggest that this brief intervention can lead to improvements in PPD, anxiety, mother-infant bonding, parenting stress, and infant temperament. Brief interventions delivered by recovered sufferers of PPD (i.e., peers) can be a novel intervention that is safe and engaging and can increase the number of mothers and birthing parents that seek and receive treatment. These workshops have the potential to effectively treat PPD and reduce treatment barriers.

Abstract

Background: Postpartum depression (PPD) affects 1 in 5 mothers and birthing parents. Unfortunately, many personal, practical, and systemic treatment barriers hinder those with PPD to receive their preferred treatment (psychotherapy). This study aimed to assess the effectiveness of Online Peer-Delivered 1-Day Cognitive Behavioural Therapy (CBT)-Based Workshops at treating PPD and its common comorbidities and complications.

Methods: Participants were randomly allocated (1:1) to receive the 1-day workshop plus treatment as usual (TAU; experimental group) or TAU and placed on a waitlist to complete the workshop 12 weeks later (control group). Participants were eligible to participate if they were $\geq$18 years old, had an infant $\leq$12 months of age, and an Edinburgh Postnatal Depression Scale (EPDS) score $\geq$10. The workshop was a 1-day synchronous online, group CBT-based intervention delivered by two trained individuals who had recovered from PPD (i.e., peers). The primary outcome was change in PPD, assessed by the EPDS. Secondary outcomes included anxiety, mother-infant bonding, parenting stress, infant temperament, social support, and partner relationship discord.

Results: 202 participants were randomized to the experimental group and 203 to the control group. The intervention led to significant reductions in EPDS scores from 15.95 pre-treatment to 11.37 post-treatment (d=0.92, p<0.01) and was associated with higher odds of exhibiting a clinically significant decrease in EPDS scores (OR=2.03, 95%CI: 1.26-3.29, NNT= 5.77, 95%CI: 3.46-17.24). Statistically significant improvements were

also seen in postpartum anxiety (d=0.76, p<0.01), infant-focused anxiety (d=0.48, p<0.001), parenting stress (d=0.42, p<0.001), and infant positive affectivity (d=-0.81, p<0.001).

Conclusion: Peer-delivered 1-day CBT-based workshops have the potential to improve PPD and its accompanying comorbidities and complications. The peer-delivered, brief, group, and online aspects of these workshops make it an ideal candidate for a low intensity evidence-based treatment for PPD. This intervention is safe, engaging, and scalable, and has the potential to increase PPD treatment access.

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List of Abbreviations and Symbols

BDI Beck Depression Inventory

B Unstandardized beta

CAD Canadian Dollar

CBT Cognitive Behavioural Therapy

CI Confidence Interval

d Cohens d

DAS Dyadic Adjustment Scale

df Degrees of freedom

EBT Evidence-based treatment

EPDS Edinburgh Postnatal Depression Scale

GAD-7 Generalized Anxiety Disorder Questionnaire

IBQ-R Infant Behavior Questionnaire-Revised

IBQ-R-NA Infant Behavior Questionnaire-Revised-Negative Affectivity

IBQ-R-ORC Infant Behavior Questionnaire-Revised- Orienting/Regulation Capacity

IBQ-R-SUR Infant Behavior Questionnaire-Revised-Surgency

IPT Interpersonal Therapy

ITT Intent-to-treat

MDD Major depressive disorder

MINI Mini International Neuropsychiatric Interview

n Number

NNT Number needed to treat

OR Odds ratio

p Probability

PAI Peer-administered intervention

PBQ Postpartum Bonding Questionnaire

PBQ-IB Postpartum Bonding Questionnaire-Impaired Bonding

PBQ-IFA Postpartum Bonding Questionnaire-Infant-Focused Anxiety

PBB-RPA Postpartum Bonding Questionnaire-Rejection and Pathological Anger

PDSS Postpartum Depression Screening Scale

PHQ-9 Physician's Health Questionnaire

PPD Postpartum depression

PSI-SF Parenting Stress Index-Short Form

QALY Quality-adjusted life year

RCT Randomized controlled trial

REDCap Research electronic data capture

SCM Stepped-care model

SD Standard deviation

SE Standard error

SPS Social Provisions Scale

SPSS Statistical Package for the Social Sciences

TAU Treatment as usual

TFI-8 Therapeutic Factors Inventory-8

T1 Time 1 (baseline)

T1 Time 2 (12 weeks post-intervention)

WAI-SR Working Alliance Inventory

χ^2 Chi-square

> Greater than

≥ Greater than or equal to

Declaration of Academic Achievement

This thesis includes one study, with the initial draft of the manuscript and incorporation of edits from coauthors conducted by the student. The formal data acquisition procedures and data collection was conducted by another PhD student. This work was completed between June 7, 2021, to February 18, 2022. Therefore, the study meets the 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 online 1-day peer-delivered cognitive behavioural therapy workshops 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. Haley Layton and Madisyn Campbell were responsible for screening and recruiting participants and data collection. Calan Savoy analyzed the data. Dr. Van Lieshout provided guidance on data analysis and interpretation of the data. Zoryana Babiy interpreted the findings and wrote the first draft of the manuscript, as well as approved the final manuscript as submitted. Haley Layton, Calan Savoy, Madisyn Campbell, Donya Merza, 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

Perinatal mental illness is one of the most common complications of pregnancy and the postpartum period (O'Hara & Wisner, 2014), with postpartum depression (PPD) being particularly prevalent (Guille et al., 2013; Wang et al., 2021). Postpartum depression is commonly defined as a major depressive episode in the context of major depressive disorder (MDD) but sometimes includes minor depression in the postpartum period (O'Hara &McCabe, 2013; Guille et al., 2013). PPD frequently includes symptoms like depressed mood, loss of interest or pleasure in activities, sleep changes, appetite disturbances, loss of energy, anxiety, guilt, negative maternal attitudes, and thoughts of suicide (American Psychiatric Association & American Psychiatric Association, 2013; Lanes et al., 2011; Pearlstein et al., 2009). Postpartum depression is distinct from the postpartum blues, which is a common, milder, transient mood disturbance that occurs three to five days after childbirth (Buttner et al., 2012). It also is different from postpartum psychosis, which is a rare, acute, and psychotic episode that typically begins within the first two weeks after delivery (O'Hara & McCabe, 2013; O'Hara & Wisner, 2014), and is typically linked to bipolar affective disorder (Rommel et al., 2021).

Prevalence estimates for PPD vary considerably depending on the definition of the disorder and the period over which prevalence is assessed (Cox et al., 2016; Lanes et al., 2011; O'Hara & Wisner, 2014). Different timeframes have been used in research and practice to define the PPD period, ranging from four weeks to one year post-delivery (O'Hara & McCabe, 2013; O'Hara & Wisner, 2014). The prevalence of PPD varies from

1.9% to 82.1% in developed countries, with the lowest prevalence reported in Germany and the highest in the United States (Slomian et al., 2019). In developing countries, the prevalence varies from 5.2% to 74.0%, with the lowest rates reported in Pakistan and the highest in Turkey (Slomian et al., 2019). According to the largest meta-analysis conducted to date, up to one in every five mothers and birthing parents (hereafter referred to as mothers) experiences PPD (Wang et al., 2021).

Research suggests that PPD has biological, psychological, and environmental underpinnings. The hormone withdrawal theories of PPD posit that reductions in specific hormones including estradiol, progesterone, and cortisol contribute to the mood changes that occur postpartum (O'Hara & McCabe, 2013; O'Hara & Wisner, 2014; Fitelson et al., 2010). Prior studies have suggested that one of the most potent risk factors for PPD is depression during pregnancy (Verreault et al., 2014; Leigh & Milgrom, 2008; Davey et al., 2011), with as many as half of these individuals reporting subsequent PPD (Sidebottom et al., 2014; Heron et al., 2004). Other risk factors for PPD include anxiety during pregnancy, neuroticism, low self-esteem, stressful life events, poor relationships, poor social support, obstetrical complications, and immigrating to a new country (Verreault et al., 2014; O'Hara & McCabe, 2013; O'Hara & Wisner, 2014). This extensive list of risk factors illustrates the complexity of PPD and the importance of applying the biopsychosocial model when attempting to understand and treat PPD.

The Impact of Postpartum Depression

Postpartum depression can have both short and longer-lasting effects on maternal health and well-being. Depression in the postpartum period increases the risk of future chronic or recurring depression (Josefsson & Sydso, 2007; Philipps & O'Hara, 1991) and elevated levels of anxiety (Radoš et al., 2018; Heron et al., 2004). It has also been shown to increase the likelihood of more risky behaviours (e.g., smoking or consuming alcohol or other recreational substances) (Whitaker et al., 2007; Ross & Dennis, 2009) and suicidal ideations (Pope et al., 2013; Cooper et al., 2007; Tavares et al., 2012). Postpartum depression is also associated with difficulties in social relationships (Jones & Coast, 2013; Wang et al., 2005), particularly those with partners (Burke, 2003; Małus et al., 2016). PPD can also compromise caregiving practices (Letourneau et al., 2011; Dennis & McQueen, 2007; McLearn et al., 2006; Minkovitz et al., 2005) and has been shown to increase maternal stress (Wang et al., 2005). These adverse effects are associated with a decreased quality of life (Slomian et al., 2019).

In addition to affecting the mother, PPD can have adverse short- and long-term effects on their infants. Mothers with PPD are at increased risk of being less sensitive and emotionally responsive and expressive toward their infant (Letourneau et al., 2011; Murray et al., 1996; Lilja et al., 2012). Such suboptimal interactions and caregiving practices can lead to impairment in the mother-infant relationship and increase infant stress (Slomian et al., 2019; Letourneau et al., 2011; Fitelson et al., 2010). Previous studies have indicated that newborns exposed to maternal depression show more dysregulated behaviour such as disorganized sleep and difficult temperament, which

reciprocally increase maternal depression and stress (Goodman, 2019; Fitelson et al., 2010). There is also evidence to suggest that growing up with a caregiver with PPD increases the risk of cognitive (Ali et al., 2013; McManus & Poehlmann, 2012), language (Quevedo et al., 2012; Kaplan et al., 2014), and emotional development (Ali et al., 2013) complications. Furthermore, long-term behavioural problems such as hyperactivity and anxiety have been reported in infants with mothers who suffered from PPD (Letourneau et al., 2011; Avan et al., 2010).

Assessing and Treating Postpartum Depression

Early and accurate detection and treatment of PPD are key to minimizing its impact on mothers and families (Fitelson et al., 2010; Burke, 2003). However, identifying PPD may be complicated by the normal physical and emotional demands of new motherhood as well as the heterogeneity of PPD symptoms (Fitelson et al., 2010, Meira et al., 2015). The most commonly used tool to assess risk for PPD is the Edinburgh Postnatal Depression Scale (EPDS), a 10-item self-report questionnaire that emphasizes emotional and functional factors (Cox et al., 1987; Davis et al., 2013). The total score ranges from 0-30, and the most common positive screen cut-offs have ranged from 10-12 (Cox et al., 1987). The EPDS has high sensitivity and specificity and is also sensitive to changes in the severity of depression over time (Cox et al., 1987). Furthermore, this scale is brief and can be completed in approximately five minutes and also has a simple method of scoring (Cox et al., 1987). Another reliable screening scale is the Beck Depression Inventory (BDI), a 21-item self-report tool (Jackson-Koku, 2016). Other screening tools

used include the Postpartum Depression Screening Scale (PDSS) (Beck & Gable, 2000) as well as the Physician's Health Questionnaire (PHQ-9) (Davis et al., 2013).

Pharmacological, psychological, and psychosocial treatment options currently exist for PPD. Antidepressants (e.g., sertraline, paroxetine, etc.) (Guille et al., 2013) are most readily available and work by altering neurotransmitter transmission and function in the brain, particularly that of serotonin and norepinephrine, which have been hypothesized to contribute to the symptoms of depression (Khushboo & Sharma, 2017). Another less common pharmacological option is hormone therapy (e.g., estrogen and progesterone patches), which alters levels of reproductive hormones that significantly decline at the time of delivery (Fitelson et al., 2010). Intravenous infusions such as brexanolone, a positive allosteric modulator of $GABA_A$ receptors, have also shown to be effective for treating PPD (Kanes et al., 2017). The most common non-pharmacological treatment for PPD is talk therapy such as Interpersonal Therapy (IPT) or Cognitive Behavioural Therapy (CBT) (Fitelson et al., 2010; Guille et al., 2013). IPT aims to address the connection between one's interpersonal problems and mood (Fitelson et al., 2010; Cuijpers et al., 2011) while CBT attempts to modify distorted patterns of negative thinking and promotes behavioural change (Fitelson et al., 2010; Li et al., 2020). Other less common treatment options include electroconvulsive therapy, bright light therapy, transcranial magnetic stimulation, structured exercise, and depression-specific acupuncture (MacQueen et al., 2016; Fitelson et al., 2010; Guille et al., 2013).

Postpartum depression treatment selection varies depending on symptoms severity and maternal preferences. Specific factors that can be taken into account include

breastfeeding status, personal history of a prior response to antidepressants, and mothers' comfort (Guille et al., 2013). Though medication is the most available treatment option, many mothers are reluctant to accept this treatment due to infant exposure concerns (Boath et al., 2004; Li et al., 2020), and adherence to medication can be poor (Hadfield & Wittkowski, 2017). Mothers, therefore, frequently prefer psychotherapy (O'Mahen & Flynn, 2008; Chabrol et al., 2004) and its efficacy and durability relative to pharmacotherapy have been favourable. A meta-analysis conducted by Cuijpers and colleagues (2013) found that CBT yields comparable outcomes to antidepressant medication and that the combination of CBT and pharmacotherapy is superior to pharmacotherapy alone for the treatment of depression. Presently, clinical practice guidelines recommend evidence-based psychotherapies for mothers with mild-to-moderate perinatal depression, while antidepressant medication alone or in combination with psychotherapies for moderate-to-severe depression (MacQueen et al., 2016; Guille et al., 2013).

Barriers to Postpartum Depression Treatment

Despite the long-lasting detrimental impacts of PPD, only 1 in 10 of those with PPD receive treatment (Bowen et al., 2012; Cox et al., 2016) due to practical and personal barriers (Gjerdingen & Yawn, 2007; Goodman et al., 2009; Grissette et al., 2018). Though most mothers prefer psychotherapy over pharmacotherapy (O'Mahen & Flynn, 2008; Chabrol et al., 2004), an abundance of treatment barriers prevent them from receiving it. First, there are not enough mental health providers to offer effective

psychotherapy (Gjerdingen & Yawn, 2007; Byatt et al., 2012). Even when experts are available, psychotherapy can be costly, requires a formal referral from a family physician, and waitlists can be long (Gjerdingen & Yawn, 2007; Rice et al., 2022). Furthermore, due to the busy schedules that most new mothers have, it is often challenging to leave their homes or fit additional appointments into their day (Guille et al., 2013; Goodman, 2009). The time and travel required and the need to secure childcare, which may require additional monetary expenditure, are also burdensome (Hadfield & Wittkowski, 2017; Guille et al., 2013; Rice et al., 2022; Goodman, 2009). Lastly, mothers have reported that they lack knowledge of the resources available to them and oftentimes fail to completely understand their diagnosis, contributing to them not seeking treatment (Rice et al., 2022; Grissette et al., 2018).

Personal barriers that some mothers have reported is their lack of comfort and trust in receiving care delivered by professionals (Dennis & Chung-Lee, 2006; Hadfield & Wittkowski, 2017). In a qualitative study conducted by Rice and colleagues (2022), mothers expressed that in addition to the stigma and practical barriers they face, they also feel that trained professionals might not fully understand their experiences with PPD, making them reluctant to consult with a professional. New mothers have also expressed that professionals may lack the skills, resources, time, and knowledge on PPD to adequately support their needs (Olson et al., 2002; Katon & Ludman, 2003). Others have also reported that treatment is only available to privileged individuals, such as ones that have a connection with the providers (Rice et al., 2022). Overall, mothers have endorsed

various challenges and drawbacks to receiving professional treatment, which may at least partly explain the low treatment rate.

Task-Shifting and Peer-Administered Interventions

Task-shifting, the redistribution of work from specialized experts to those with less training (i.e., paraprofessionals) has become increasingly popular in mental health service delivery, particularly in areas where resources are limited (Singla et al., 2020; Singla et al., 2014; Hoeft et al., 2018; Fulton et al., 2011). Given the scarcity of skilled mental healthcare professionals (Byatt et al., 2012), task-shifting the treatment of PPD could have the potential to increase the number of individuals who get treatment and enable specialists to focus on more severe cases. A review conducted by Montgomery and colleagues (2010) concluded that paraprofessional-delivered CBT for depression and anxiety generally achieves comparable outcomes to delivered by professionals, but the question remains when and how this approach should be applied to maximize outcomes. A more recent cluster-RCT compared a group-based cognitive-behavioural intervention delivered by professionals or paraprofessionals compared to usual care on depressive symptom reductions and prevention of MDD (Tandon et al., 2021). Though no statistically significant differences between intervention groups and the control arm were found in this study, non-inferiority analyses found that paraprofessionals generated similar reductions in depressive symptoms as mental health professionals (Tandon et al., 2021). These findings suggest that the training level does not necessarily correlate with

clinical improvement and that this approach could result in similar levels level of intervention quality at lower costs.

One particular type of task-shifting widely implemented is peer-administered intervention (PAIs), those delivered by individuals with experience with a particular mental health complication and without prior training (Bryan & Arkowitz, 2015). PAIs investigated in those with PPD have yielded clinical improvements (Dennis et al., 2009; Shorey et al., 2019; Amani et al., 2021) and were also more cost-effective (Singla et al., 2014; Huang et al., 2020; Dennis et al., 2009; Fuhr et al., 2019; Sikander et al., 2019). A review of 17 studies, 12 of which included participants in the perinatal period, found that peer support interventions significantly reduced depressive symptoms when compared to standard care (Shorey & Chua, 2022). A recent meta-analysis suggested that PAIs that were telephone/internet-based, individual combined with group format, delivered at least once a week, and conducted in low-resource countries yield the greatest effects (Fang et al., 2022).

In addition to potentially being clinically effective, PAIs align with the treatment preferences of mothers (Rice et al., 2022). Mothers generally prefer to receive treatment from someone who they feel truly understands them, can validate their feelings, and provide hope for the future (Rice et al., 2022; Dennis and Chung-Lee, 2006). As motherhood involves significant changes in one's priorities, responsibilities, and self-identity, this transition oftentimes makes mothers feel alone, overwhelmed, and not understood (Arendell, 2000; Rice et al., 2022). Having someone who can relate and model pathways to recovery can be helpful for mothers to be able to adjust optimally

(Arendell, 2004; Rice et al., 2022). Individuals who have recovered from PPD can offer reassurance and share their PPD journey, something that many professionals are unable to offer (Solomon, 2004; Bryan & Arkowitz, 2015). Mothers also report struggling with social isolation postpartum (Almond, 2009; Corrigan et al., 2015) and peers can increase perceived social support and broaden community networks (Solomon, 2004; Dennis, 2013; Bryan & Arkowitz, 2015). Not only do mothers perceive peers to be more acceptable intervention delivery agents, but studies have shown that their family members (e.g., spouses) reported that they believe peers can provide optimal care (Singla et al., 2014).

Peer-administered interventions have the potential to reduce many of the barriers associated with seeking and receiving treatment for PPD. Due to the high number of recovered PPD sufferers, peers can offset provider scarcity. Task-shifting psychotherapy from scarce professionals to plentiful peers can also result in cost savings (Singla et al., 2014; Huang et al., 2020; Dennis et al., 2009; Fuhr et al., 2019; Sikander et al., 2019), enabling more mothers to receive treatment that they otherwise would not be able to afford. The self-referral nature of some PAIs can also reduce wait times during a period when potential consequences are serious for both the mom and baby (Rice et al., 2022) and encompasses empowerment and accountability for one's own future (Resnick & Rosenheck, 2008). Furthermore, interventions delivered by peers can mitigate the stigma associated with PPD (Katon & Ludman, 2003; Goodman, 2009), as it can be comforting to receive help from individuals who have recovered from a similar experience. Lastly, PAIs can support mothers in indirect ways such as by helping them navigate the

healthcare system, advocating for their needs, and helping mothers truly understand their diagnosis (Rice et al., 2022).

Stepped-Care Models of Postpartum Depression Care

International practice guidelines recommend stepped-care approaches to treat depression and state that those with PPD should be given priority access (NICE, 2011; NICE, 2020). In stepped-care models (SCM), patients initiate treatment at the least intensive step (i.e., low-intensity treatment) shown to be effective for their problem, and then step up or down depending on clinical response or increasing need or risk (Firth et al., 2015; Seekles et al., 2011; Van Straten et al., 2010). Low-intensity evidence-based treatments (EBT) are characterized as being brief, voluntary, low-cost, least restrictive, and low-risk (Bower & Gilbody, 2005; Van Straten et al., 2010). Unfortunately, very few low-intensity EBTs are available for PPD. This PPD treatment gap in the SCM needs to be further explored as this system of delivering care has shown to be at least as effective as usual care in treating adult depression (Firth et al., 2015).

A key driver for stepped-care delivery systems is improving access to evidence-based psychotherapy (Firth et al., 2015). This approach can reduce the need for some individuals to receive more intense treatment options if not needed, ultimately improving the allocation of scarce resources (Van Straten et al., 2015; Van Straten et al., 2010). Adhering to this model and developing novel low-intensity EBTs can provide equal opportunity to more individuals with PPD by enabling a more efficient way of distributing resources.

Brief Psychotherapy

Standard duration CBT is effective for treating depression (Cuijpers et al., 2013), however, there have been attempts to develop briefer CBT alternatives. The typical CBT treatment course for mild to moderate depression ranges anywhere between eight to 16 sessions, with more severe cases requiring more than 16 sessions with booster sessions also being recommended (Gautam et al., 2020). Recently, 1-day CBT interventions have begun to be developed and have been shown some promise for treating depression in general population samples of adults (Brown et al., 2000; Horrell et al., 2014; Yunus et al., 2019) as well as youth with depression (Brown et al., 2019). It has been suggested that brief interventions can be less costly and require fewer resources, are preferred by many over longer courses of CBT, and can ultimately lead to more individuals being treated (Horrell et al., 2014; Brown et al., 2000; Brown et al., 2004).

Fewer brief CBT interventions have been investigated in the PPD population, though the clinical efficacy and potential to reduce treatment barriers in general adult depression samples are encouraging. A study conducted by Van Lieshout and colleagues (2021) found that 1-day CBT-based workshops led to significant improvement in PPD and its accompanying comorbidities (e.g., anxiety) and complications (e.g., mother-infant bonding and social support). Since new mothers have busy schedules (Guille et al., 2013; Goodman, 2009), many may experience challenges with committing to lengthier CBT. A study that looked at the characteristics of individuals who attended and benefited most from CBT-based self-confidence workshops (i.e., depression workshops) found that these workshops attracted a representative proportion of Black and ethnic minority participants

(Prytys et al., 2009). It is possible that briefer intervention can also attract traditionally more difficult-to-engage groups that would otherwise be left untreated (Prytys et al., 2009).

Individual vs Group Psychotherapy

Literature has suggested that CBT delivered in both individual and group formats can improve depression, with some caveats associated with the former (Cuijpers et al., 2013). Trials have found that group and individual CBT for depression yield comparable effects (Brown et al., 2011; Lockwood et al., 2004), while other studies have concluded that individual CBT may be superior (Craig & Nathan, 2009; Hauksson et al., 2017). A recognized drawback of individual psychotherapy, including one-on-one CBT, is that it requires a greater number of mental health providers, further exacerbating the mental health provider shortage challenge (Byatt et al., 2012; Huang et al., 2020). Traditional group psychotherapy on the other hand can treat up to 15 patients at a time (Ezhumalai et al., 2018), leading to more individuals receiving help at once. Individual therapy is also more costly, and a naturalistic study conducted by Brown and colleagues (2011) found that individual CBT was 1.5 times more expensive to provide than group CBT.

Group therapy may be particularly effective for PPD due to the strong association between PPD and social support (Corrigan et al., 2015; Goodman & Santangelo, 2011; Almond, 2009). An RCT that looked at the effectiveness of three 12-week psychological interventions (including group CBT) compared to routine care for PPD found that group CBT not only led to reductions in depression and anxiety but also led to improvements in

perceived social support (Milgrom et al., 2005). Several hypotheses have been proposed to explain the relationship between the social aspect of group therapy and depressive symptom reduction. It is possible that being in a group with individuals with similar struggles can normalize the diagnosis and reduce stigma and feelings of isolation (Goodman & Santangelo, 2011; Bryde Christensen et al., 2021). Having others present permits support and encouragement and can also promote positive mirroring (Goodman & Santangelo, 2011; Bryde Christensen et al., 2021). Furthermore, the sense of belonging to a group and being mutually supportive can increase motivation to attend therapy and complete tasks (i.e., homework) outside the intervention hours, leading to better outcomes (Bryde Christensen et al., 2021). Patients have also reported a greater willingness to share vulnerable things in group settings, and that others in the group offer them renewed hope for the future (Bryde Christensen et al., 2021). These group cohesion elements are not possible with individual therapy, making this format ideal for PPD considering its strong social support underpinning (Goodman & Santangelo, 2011; Corrigan et al., 2015; Almond, 2009).

Online Psychotherapy

Telemedicine interventions such as telephone-based interventions, mobile applications, and guided and unguided internet-based interventions have been used to treat PPD (Liu et al., 2022; Nair et al., 2018). Telehealth alternatives can increase access and have yielded clinically favourable outcomes for PPD (Liu et al., 2022). Moderate effect sizes have been reported in internet-based interventions for PPD (Milgrom et al.,

2021), including online CBT (Roman et al., 2019). A trial conducted by Milgrom and colleagues (2021) suggested that a web-based CBT intervention was at least as effective as face-to-face CBT in achieving remission from PPD. Another telephone-based peer support intervention for new mothers (≤2 weeks postpartum) halved the risk of developing PPD at 12 weeks postpartum (Dennis et al., 2009). Computerized self-help approaches have also served as a low-intensity EBT (Trevillion et al., 2020; Danaher et al., 2013; Lin et al., 2018), however, many find unsupported self-help exercises too onerous (Trevillion et al., 2020; Danaher et al., 2013; Lin et al., 2018). It is clear that unsupported online interventions can be effective in mitigating PPD, however, many still report a preference for synchronous therapist-delivered treatments (Pugh et al., 2016) as they encompass a sense of accountability and therapeutic alliance.

In addition to the clinical effectiveness of telemedicine for PPD, practical advantages have also been reported. This format can offer a more private and comfortable option for individuals who are adjusting to a major life transition and are experiencing high levels of stress (i.e., adjusting to motherhood) (Shorey et al., 2019; Liu et al., 2022). Considering the busy nature of motherhood, online interventions can also reduce the time allocated for transportation and the need to secure childcare, and are often less financially demanding (Guille et al., 2013; Goodman, 2009; Roman et al., 2019). In addition, online interventions are more likely than in-person treatments to reach individuals in poorly resourced areas (i.e., rural areas) (Andersson, 2010). Anonymity and convenience are also unique aspects of non-face-to-face intervention, something that mothers with PPD value

(Milgrom et al., 2021). Overall, telemedicine for PPD has improved healthcare accessibility, flexibility, and privacy (Shorey et al., 2019; Milgrom et al., 2021).

Thesis Hypothesis and Objectives

Given the high prevalence of PPD, its detrimental short- and long-term effects on both the mother and infant, and low treatment rates, we sought to determine if a synchronous 1-day online group workshop delivered by individuals who have recovered from PPD (i.e., peers) could improve PPD. Our secondary objective was to investigate the impact that these workshops have on the common comorbidities (anxiety) and complications (mother-infant attachment, social support, partner relationship discord, parenting stress, and infant temperament) of PPD.

We hypothesize that 1-day CBT-based workshops plus TAU would result in a significant reduction in depressive symptoms compared to the TAU control. We also posit that 1-day CBT-based workshops plus TAU will also yield greater improvements in anxiety, mother-infant bonding, parenting stress, infant temperament, social support, and relationship quality of couples compared to the control group.

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Chapter 2: 1-Day Peer-Delivered Cognitive Behavioural Therapy Workshops for Postpartum Depression

Introduction

Postpartum depression (PPD) affects up to 20% of mothers and birthing parents (Lanes et al., 2011; Hadfield et al., 2017), and as many as 1 in 3 mothers experienced clinically significant depression symptoms during the COVID-19 pandemic (Racine et al., 2021). Postpartum depression is associated with an increased risk of sub-optimal infant caregiving, impaired mother-infant bonding, future depressive episodes, and the risk of cognitive, emotional, and behavioural problems in offspring (Slomian et al., 2019; O'Hara and McCabe, 2013; Goodman, 2019, MacQueen et al., 2016). Even in high-income countries, as few as 10% of those with PPD receive evidence-based treatment (EBT) (Bowen et al., 2012; Cox et al., 2016).

While pharmacotherapy is widely available, individuals with PPD can be reluctant to use these agents, particularly during lactation (Fitelson et al., 2010), and generally prefer psychotherapy (Dennis & Chung-Lee, 2006; Letourneau et al., 2011). However, skilled psychotherapy providers can be scarce and individual treatment can be costly (Gjerdingen & Yawn, 2007; Byatt et al., 2012). Some practice guidelines recommend a stepped-care approach to treat depression (Seekles et al., 2011), prioritizing providing access to psychotherapy for those with PPD (NICE, 2020). In these models, it is recommended that patients start with a low-intensity treatment and step up to higher intensity if needed (Seekles et al., 2011; Van Straten et al., 2010). Low-intensity treatments are less burdensome (e.g., provider expertise and resource demand is lower)

and cheaper (Bower & Gilbody, 2005; Van Straten et al., 2010). However, such treatment options are scarce for PPD in particular. Mobile applications (Tsai et al., 2022) and self-help approaches (Trevillion et al., 2020; Danaher et al., 2013; Lin et al., 2018) have been used, but effectiveness is not well-established, with sufferers frequently reporting high satisfaction and preference for treatment supported by a therapist (Pugh et al., 2016). Online self-help psychological programs could be effective for perinatal depression, though they can often be onerous and time-consuming, requiring significant motivation and having lower engagement than guided, synchronous interventions (Trevillion et al., 2020; Danaher et al., 2013; Lin et al., 2018; Pugh et al., 2016).

If proven effective, 1-day cognitive behavioural therapy (CBT)-based workshops are another low-intensity EBT alternative for PPD that could be suitable for stepped care models. Previous trials have shown that brief interventions may be effective for treating depression in general population samples of adults in a durable and cost-effective way (Brown et al., 2004; Horrell et al, 2014; Brown et al., 2008). A recent study suggested that when adapted for PPD and delivered by expert therapists, such workshops could produce improvements in depression, anxiety, the mother-infant relationship, infant temperament, and social support (Van Liehsout et al., 2021).

However, the numbers of healthcare professionals with specialized expertise in treating PPD are low (Byatt et al., 2012), and human resource shortages in mental health services (Jannati et al., 2021) continue to expand. The high costs of privately-delivered psychotherapy (Gjerdingen & Yawn, 2007), as well as a fear of judgement, long waitlists, a lack of time, and challenges securing childcare prevent many with PPD from receiving

treatment (Goodman 2009; Gjerdingen & Yawn, 2007; Hadfield & Wittkowski, 2017). Individuals with PPD also frequently report that trained professionals lack the time, skills, and resources to support their recovery (Gjerdingen & Yawn, 2007), and some have expressed a reluctance to obtain professional assistance or share their emotional problems with professionals due to fears of not being fully understood (Dennis and Chung-Lee, 2006; Hadfield & Wittkowski, 2017). These sufferers frequently express a preference to receive treatment from someone who they feel truly understands their experience with PPD and can offer symptom normalization, validation, and role-model pathways to recovery, things that most professionals are unable to provide (Hadfield et al., 2017; Dennis and Chung-Lee, 2006).

Peer-administered interventions (PAIs), those delivered by former sufferers with no formal training are increasingly recognized as effective treatment alternatives for a variety of mental health problems (Bryan & Arkowitz, 2015; Dennis and Chung-Lee, 2006; Newman et al., 2019). Individuals who have previously experienced similar problems can be credible and trustworthy sources of support and can provide experiential knowledge, modelling pathways to recovery (Solomon, 2004; Bryan and Arkowitz, 2015; Letourneau et al., 2011). Mothers and birthing parents who have recovered from PPD can also offer a sense of symptom validation and hope for the future, reducing feelings of judgment, while offering empathy and understanding (Solomon, 2004; Bryan and Arkowitz, 2015; Dennis and Chung-Lee, 2006). Considering that low social support is a significant predictor of PPD, PAIs can help broaden networks in a cost-effective and scalable way (Corrigan et al., 2015, Letourneau et al., 2011; Dennis, 2013).

The earliest RCTs of PAIs for PPD (Dennis 2003; Dennis et al., 2009; Letourneau et al., 2011) used unstructured, supportive interventions that were delivered one-on-one, and their positive effects appeared short-lived. Of the 16 RCTs conducted, just four involved interventions delivered by those with past PPD (Dennis et al., 2009; Letourneau et al., 2011; Gjerdingen et al., 2013; Shorey et al., 2019). Two showed that telephone-based support could reduce PPD symptoms (Dennis et al., 2011; Gjerdingen et al., 2013), whereas peer home visits did not (Letourneau et al., 2011). In another trial, technology-based support offered by peers helped reduce PPD and anxiety symptoms, but it was unstructured and delivered one-on-one, potentially limiting its scalability and cost-effectiveness (Shorey et al., 2019). Two large RCTs of structured interventions for PPD delivered by non-professionals have been conducted, however, these took place in low and middle-income countries and the peers were not selected for having prior experience with PPD (Fuhr et al., 2019; Sikander et al., 2019). A 9-week group CBT for PPD intervention delivered by recovered peers and set in Canada yielded clinically significant improvements in depression, but the treatment was delivered in person, and the sample was small and mainly white (Amani et al., 2021). Although these findings are encouraging, a novel low-intensity intervention that is structured, accessible, engaging, scalable, and delivered by peers could help to address the high prevalence of PPD and low treatment rates.

The primary objective of the present trial was to determine if peer-delivered online 1-day CBT-based workshops for PPD added to TAU can improve PPD more than TAU alone. Secondary objectives included assessing if these workshops can also reduce

anxiety and improve mother-infant bonding, parenting stress, infant temperament, social support, and partner relationship discord.

Methods

Study Design and Participants

This parallel-group, randomized clinical trial (RCT) took place in the Province of Ontario, Canada. Mothers and birthing parents were eligible to participate if they lived in Ontario, were ≥18 years old, had an infant ≤12 months old, and had an EPDS Score ≥10. This EPDS score cut-off was selected to optimize uptake and generalizability, as up to 30% of individuals with PPD can be affected by these levels of symptoms (Racine et al., 2021). In order to maximize public health relevance of the findings, no other exclusion criteria were applied. Participants self-referred to the study after seeing information about the study through social media advertising (i.e., Facebook, Instagram), or receiving study information from public health or community partners, midwifery groups, and obstetrical and family practices. All participants provided written informed consent before randomization.

Randomization and Masking

Mothers and birthing parents were continuously recruited and allocated in a 1:1 to receive an online 1-day CBT–based workshop plus TAU (experimental group) or to receive TAU and be put on a waitlist to complete the workshop 12 weeks later (control

group). In Ontario, healthcare is universally available to all citizens, so TAU can include any medications, psychotherapy, and other types of treatment.

Randomization with block sizes of 4, 6, and 8 was used. The randomization scheme was generated in the statistical computing program R by an independent analyst and was implemented by the study coordinator using Research electronic data capture (REDCap) (Harris et al., 2009) upon participant enrollment, ensuring allocation concealment. The research assistants conducting data collection and data analysts were unaware of the participants' status as they only had access to study files that did not include any identifiers or group assignment information. The participants and study coordinator were not masked to group assignment.

Procedures

The intervention was a 1-day online interactive workshop that ran from 0900 to 1600 for a total of six hours of instruction (two fifteen and one thirty-minute breaks were provided), that was delivered via Zoom by two trained peer facilitators. The workshop consisted of four modules that integrated didactic teaching, group exercises/discussion, and role-playing. The first module reviewed PPD etiology with a focus on modifiable cognitive risk factors (e.g., negative thoughts and maladaptive core beliefs). The second module focused on cognitive skills (e.g., cognitive restructuring). The third module explored behavioural skills (e.g., problem-solving, behavioural activation, and assertiveness). The fourth module provided an opportunity for goal setting and action planning. All participants received an electronic copy of the 1-day CBT workshop manual

prior to the workshop. Data were collected using REDCap at enrollment (three weeks before the workshop) (T1) and 12 weeks post-workshop (T2).

Five peer facilitators were recruited through social media advertising (i.e., Facebook, Instagram), though only four delivered the workshops due to availability. The peers were eligible if they had previously experienced and recovered from PPD, and scored below clinical cut-offs of the Beck Depression Inventory (BDI-II) and Generalized Anxiety Disorder 7 (GAD-7) at the time of recruitment (Dozois et al., 1998; Spitzer et al., 2006). Peers underwent two days of in-classroom training with a perinatal psychiatrist (RJVL) that involved didactic teaching and role-playing to familiarize peers with the CBT intervention. Peers then observed a recording of the 1-day workshop delivered online by an expert therapist. In pairs, they then delivered a digitally recorded mock workshop to two trained patient actors and received feedback from the expert therapist. After the training period, peers were randomly assigned in pairs to deliver workshops. The training procedure and workshop delivery was based on an earlier pilot study (Merza et al., 2023).

Outcomes

At enrollment, participants self-reported sociodemographic characteristics (age, race/ethnicity, infant age, infant sex, marital status, household composition, educational attainment, occupational status (current and pre-maternity leave), household income, current medications, past psychotherapy/counselling, and mental health service use in the previous 12 weeks. Participants self-reported on all outcomes at enrollment (T1) and 12 weeks later (T2). No study methods changed after trial commencement.

Our primary outcome (PPD) was assessed using the Edinburgh Postnatal Depression Scale (EPDS), a 10-item measure of PPD that assesses symptoms during the previous seven days (Cox et al., 1987). Each item is scored on a four-point scale (0-3), and a score ≥10 indicates possible PPD. Based on Jacobsen and Truax's reliable change index (1991) and consistent with the work of others, a change of ≥4 points was deemed indicative of a clinically significant change in depressive symptoms (Affonso, et al., 2000; Matthey, 2004).

Our secondary outcomes included anxiety, the mother-infant relationship, parenting stress, infant temperament, social support, and couple relationship quality. The Generalized Anxiety Disorder Questionnaire (GAD-7) was used to assess anxiety and contains seven items scored on a 0-3-point scale, with higher scores indicating worse anxiety (Spitzer et al., 2006). The GAD-7 has been validated in postpartum samples (Simpson et al., 2014).

The Postpartum Bonding Questionnaire (PBQ) was used to assess the mother-infant relationship. The scale contains 25 self-reported items with each item scored on a 0-5 point scale (Brockington et al., 2006). The PBQ contains four subscales: impaired bonding (IB), rejection and pathological anger toward the infant (RPA), infant-focused anxiety (IFA), and incipient abuse (Brockington et al., 2006). The incipient abuse scale was not examined due to past performance issues (Klier, 2006).

The Parenting Stress Index-Short Form (PSI-SF) is a 36-item scale of parenting stress with each item scored on a 1-5 point scale (Barroso et al., 2016). The PSI contains three subscales: parental distress, parent–child dysfunctional interaction, and difficult

child. The total scale scores were used, with higher scores indicating greater levels of stress.

The Infant Behavior Questionnaire–Revised Very Short Form (IBQ-R) is a parent-report measure that assesses infant temperament (Putnam et al., 2014). The scale contains 37 items, with each item scored on a seven-point scale. The IBQ-R measures three domains: positive affectivity/surgency (i.e., smiling, laughter, and pleasure); negative emotionality (i.e., distress related to limitations, fear, and reactivity); and orienting/regulatory capacity (i.e., soothability and orienting). Individual domain scores were used.

The Social Provisions Scale (SPS) was used to measure an individual's perception that their social relationships provide support (Cutrona & Russell, 1983). The scale contains 24 items with each item scored on a four-point scale. The total score was used, with higher scores indicating better perceived support.

The Dyadic Adjustment Scale (DAS) was used to measure an individual's perceptions of his/her relationship with an intimate partner (Carey et al., 1993). The scale contains 32-item with items scored on a 2-, 5-, 6-, or 7-point scale. The DAS contains four subscales: dyadic consensus, dyadic satisfaction, dyadic cohesion, and affective expression. The total scores were used, with higher scores indicating greater relationship satisfaction.

We defined adverse events as any event that resulted in death, was life-threatening, and/or required hospitalization. All adverse events were reported and documented by all study personnel. Participants who scored >0 on question 10 of the

EPDS were screened for suicidal ideation. These results were reviewed with a perinatal psychiatrist and participants deemed to be at increased risk had a letter sent to their primary healthcare provider and/or were referred to outpatient psychiatric care or emergency services as needed.

Statistical Analysis

Our sample size was calculated to be 380 (190 in each treatment arm). This was based on a type one error of 0.05 and 90% power to detect a medium effect size of 0.35, anticipating 10% attrition of enrolled participants (at twelve weeks). This study used RMASS to perform sample size and power estimations (Bhaumik et al., 2008; Hedeker, Gibbons, & Waternaux, 1999; Roy, Bhaumik, Aryal, & Gibbons, 2007). No interim analyses were conducted.

T-tests (continuous data) and χ^2 tests (dichotomous data) were used to compare demographic characteristics between participants assigned to the experimental group, and to the control group, measured at T1. These tests were also used to investigate predictors of attrition, comparing social and demographic differences between individuals who completed the study vs. those who were lost to follow-up. This study employed an intent-to-treat (ITT) approach that utilized participant data regardless of treatment non-compliance, protocol deviation or withdrawal following randomization. In keeping with ITT, all follow-up data were analyzed according to participant randomization at the outset of the study. This approach is generally thought to offer more conservative estimates of

treatment effect, but may more accurately model real-world variability in treatment compliance (Gupta, 2011).

Differences in study outcomes between groups between T1 and T2 were analyzed using linear mixed models, employing restricted maximum likelihood estimation. As restricted maximum likelihood estimation allows for the inclusion of all observations of participants who completed T1 but were lost to follow-up, this approach is more powerful than traditional repeated-measures techniques utilizing listwise deletion. This method also conserves the ITT approach such that the data of participants who did not complete the study is still considered in the model estimates at those times where data is still available. This model utilized a two-level hierarchy in which outcomes at the study timepoints (T1, T2) (level 1) were nested within individual participants (level 2). A random-effects intercept was included to adjust for unobserved heterogeneity at the level of the individual participants, and for clustering effects. Group assignment was included as a fixed-effect predictor allowing us to investigate the effect of the intervention between treatment and control groups. Time was also specified as a categorical (repeated-measures) predictor, and these models included a group x time interaction term to assess the treatment effect of the intervention from baseline and between groups. Within group mean differences and Cohen's *d* were also provided using estimated marginal means to quantify the effect size of the intervention within the treatment group, independent of the control group.

Logistic regression was also employed to compare the difference in odds of experiencing a ≥4-point improvement in EPDS scores from T1 to T2, between treatment

and control groups. For ease of interpretation, raw prevalence of EPDS improvement are reported in both groups alongside these models. Additionally, number needed to treat (NNT) was also calculated, estimating the number of participants who would need to be enrolled in the experimental group to generate one case of clinically significant improvement above that which would be expected to occur without the treatment (i.e., above that observed in the control group). All analyses were conducted in SPSS Statistics 28 (SPSS Statistics, IBM Corporation).

Results

The study took place from June 7, 2021, to February 18, 2022, with the pre-treatment demographic characteristics of participants summarized in Table 1. Participants (n=405) were randomized to the experimental (n=202) or control (n=203) groups (Figure 1). Of the 405 enrolled, 52 (12.8%) did not complete baseline (T1) measures. Of these, 18 (4.4%) were in the experimental group ($\chi^2$5.56; P = 0.018 [n = 405]. Treatment and control group participants did not differ in average maternal age, infant age or sex, ethnicity, marital status, average household income, use of subsidized housing, prior use of talk therapy, or baseline EPDS and GAD scores. There were no statistically significant differences in attrition between the experimental group (n=41, 22%) and control group (n=35, 21%) between T1 and T2. There were also no statistically significant differences in the age of participants, infant age, infant sex, ethnicity, use of subsidized housing, baseline EPDS and baseline GAD scale scores between those participants who completed the study and those who withdrew prior to T2. However, participants who were married

or in a common-law relationship were more likely to remain in the study than those who were not (96% vs 87%, χ^2=8.99, p=0.003). Likewise, participants who were lost to follow-up reported lower household income ($94,868 vs. $128,665, t=4.37, p<0.001).

Figure 1: Flow Diagram of Study Participants

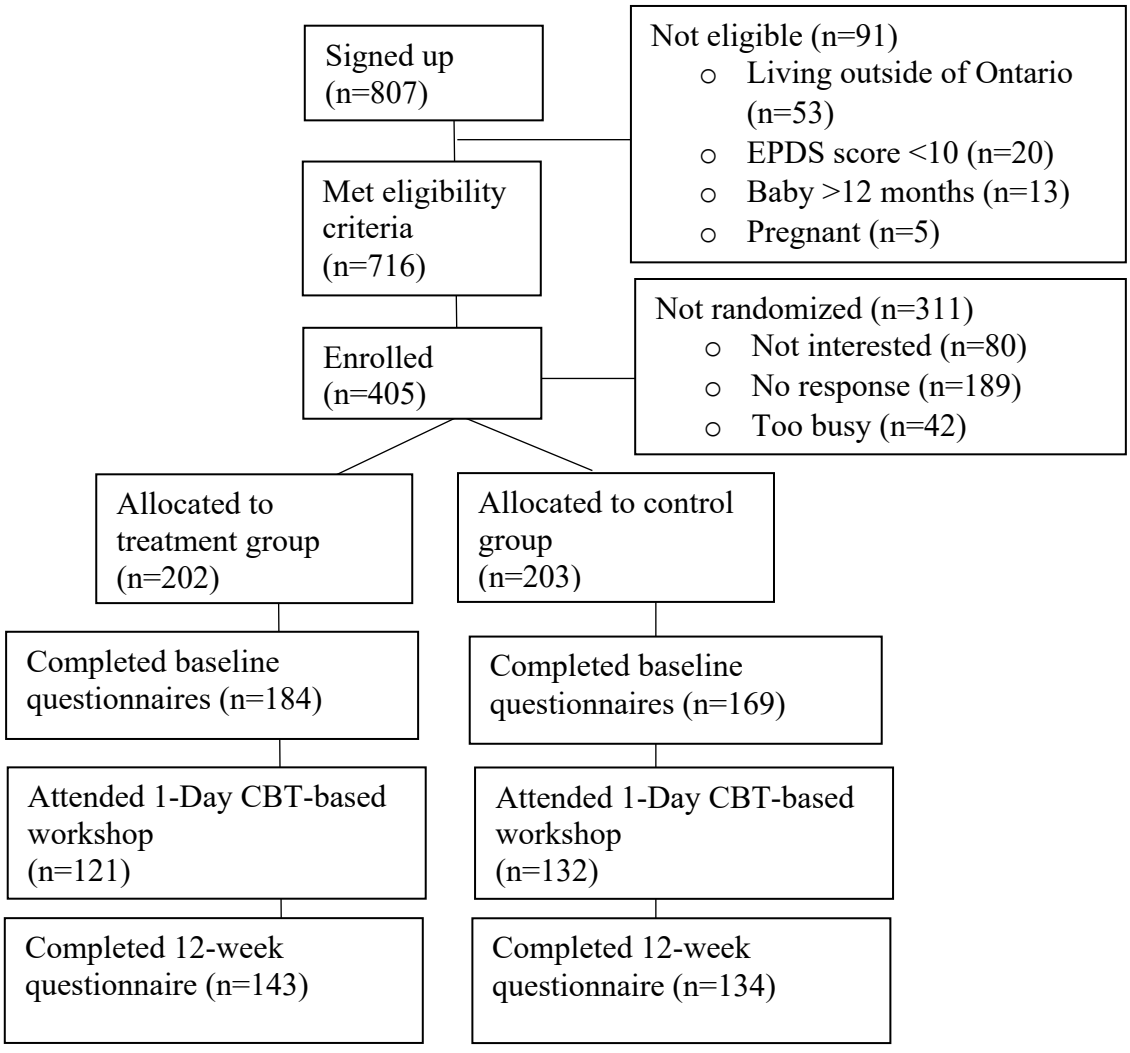

Table 1: Baseline Characteristics of Experimental and Control Group Participants

Characteristics	Experimental Group (184)	Waitlist Control Group (169)	t/chi-sq	p
Ethnicity (% white)	127 (69%)	103 (61%)	2.53	0.11
Maternal Age, years (SD)	32.1 (4.60)	32.60 (3.84)	1.08	0.28
Infant Age, months (SD)	5.69 (3.11)	6.24 (3.21)	1.64	0.10
Infant Sex (% female)	106 (58%)	75 (44%)	6.19	0.05
Marital Status (% married/common law)	171 (93%)	161 (95%)	0.86	0.36
Household Income (CAD)	123,233 (62,132)	119,378 (60,428)	0.59	0.56
Prior use of talk therapy	87 (47%)	91 (54%)	1.52	0.22
EPDS at Baseline	15.9 (4.60)	16.5 (4.50)	1.07	0.28
GAD At Baseline	12.3 (5.10)	12.7 (4.90)	0.64	0.53

SD= Standard Deviation, CAD= Canadian Dollars, EPDS= Edinburgh Postnatal Depression Scale, GAD-7= 7-item Generalized Anxiety Disorder scale

Statistically significant group x time interactions predicted change in EPDS (B=-1.61, [0.56], p= 0.01), GAD-7 (B=-2.11, [0.63], p<0.001), PBQ-IFA (B= -0.76, [0.30], p= 0.01), PSI-Total (B=-4.59, [1.98], p= 0.02), and IBQ-R-Sur (B=0.48, [0.14], p<0.001) scores following treatment (Table 2).

Table 2*:* Group x Time Interactions for Primary and Secondary Outcomes

Outcome Measure	B	SE	df	t value	*p* value
EPDS	-1.61	0.56	303.12	-2.85	0.01*
GAD-7	-2.11	0.63	304.30	-3.36	<.001*
PBQ-IB	-1.17	0.70	301.11	-1.67	0.10
PBQ-RPA	-0.39	0.43	294.79	-0.92	0.36
PBQ-IFA	-0.76	0.30	291.06	-2.57	0.01*
PSI	-4.59	1.98	301.86	-2.32	0.02*
IBQ-R-SUR	0.48	0.14	279.41	3.51	<.001*
IBQ-R-NA	0.05	0.13	281.94	0.37	0.71
IBQ-R- ORC	-0.05	0.11	280.22	-0.49	0.62
SPS	0.59	0.94	298.58	0.63	0.53
DAS	0.44	1.76	275.02	0.25	0.80

Abbreviations: EPDS= Edinburgh Postnatal Depression Scale, GAD-7= 7-item Generalized Anxiety Disorder scale, PBQ= Postpartum Bonding Questionnaire, IB= Impaired Bonding, RPA= Rejection and Pathological Anger, IFA= Infant-Focused Anxiety, PSI= Parenting Stress Index, IBQ-R= Infant Behavior Questionnaire-Revised, SUR= Surgency, NA= Negative Affectivity, ORC= Orienting/Regulation Capacity, SPS= Social Provisions Scale, DAS= Dyadic Adjustment Scale.
*Statistically significant ($p < .05$) mean difference.

After stratifying by intervention group (Table 3), experimental group participants reported a decrease in average EPDS scores from 15.95 pre-treatment to 11.37 post treatment (*d*=0.92), GAD-7 scores from 12.33 to 8.25 (*d*=0.76), PBQ-IFA scores from 5.27 to 3.78 (*d*=0.48), and PSI-total scale scores from 91.97 to 83.63 (*d*=0.42), and IBQ-R surgency scores from 3.61 to 4.72 (*d*=0.81). Finally, 76 (53%) experimental group participants reported a ≥4-point improvement in EPDS scores compared to 48 (36%) of control group participants (OR=2.03, 95%CI: 1.26-3.29, NNT= 5.77, 95%CI: 3.46-17.24).

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

	T1 Mean (SD)	T2 Mean(SD)	Cohen's *d*	T1 Mean (SD)	T2 Mean (SD)	Cohen's *d*
EPDS*	15.95 (4.75)	11.37 (5.24)	0.92	16.47 (4.75)	13.50 (5.20)	0.60
GAD-7*	12.33 (5.10)	8.25 (5.67)	0.76	12.66 (5.10)	10.69 (5.62)	0.37
SPS	75.23 (11.34)	76.79 (11.88)	-0.13	74.80 (11.48)	75.77 (11.99)	-0.08
DAS	106.27 (20.7)	108.26 (21.9)	-0.09	103.32 (20.88)	104.86 (21.72)	-0.07
PBQ-IB	12.25 (6.78)	8.87 (7.38)	0.48	12.42 (6.80)	10.20 (7.33)	0.31
PBQ-RPA	6.44 (4.31)	4.46 (4.68)	0.44	6.75 (4.33)	5.17 (4.65)	0.35
PBQ-IFA*	5.27 (2.97)	3.78 (3.21)	0.48	5.17 (2.98)	4.44 (3.20)	0.24
PSI*	91.97 (18.95)	83.63 (20.36)	0.42	92.41 (19.08)	88.65 (20.31)	0.19
IBQ-R-SUR*	3.61 (1.32)	4.72 (1.44)	-0.81	3.92 (1.33)	4.55 (1.42)	-0.46
IBQ-R-NA	3.54 (1.19)	3.92 (1.32)	-0.30	3.63 (1.21)	3.96 (1.29)	-0.27
IBQ-R-ORC	5.01 (0.92)	5.14 (1.03)	-0.13	5.06 (0.92)	5.24 (1.00)	-0.19

Abbreviations: EPDS = Edinburgh Postnatal Depression Scale, GAD-7 = 7-item Generalized Anxiety Disorder scale, PBQ = Postpartum Bonding Questionnaire, IB = Impaired Bonding, RPA = Rejection and Pathological Anger, IFA = Infant-Focused Anxiety, PSI = Parenting Stress Index, IBQ-R = Infant Behavior Questionnaire-Revised, SUR = Surgency, NA = Negative Affectivity, ORC = Orienting/Regulation Capacity, SPS = Social Provisions Scale, DAS = Dyadic Adjustment Scale.
*Statistically significant ($p < .05$) mean difference and Group × Time interaction.

Discussion

Despite its high prevalence, relatively few individuals with PPD are able to access treatment, particularly evidence-based psychotherapies. The results of this RCT suggest that peer-delivered online 1-day CBT-based workshops for PPD may be an effective means of increasing access to treatment, producing clinically significant improvements in PPD when added to TAU relative to TAU alone. They also appear to improve anxiety, infant-focused anxiety, parenting stress, and increase positive affectivity in infants.

The size of the effect of this intervention on PPD symptoms is similar to that of online 1-day CBT-based workshops delivered by experts (Van Lieshout et al., 2021) and to longer courses of CBT for perinatal depression (Sockol, 2015). The magnitude of effect is also similar to trials of 1-day workshops for adults with depression in the general population (Brown et al., 2008; Horrell et al., 2014). When compared to other PAIs for PPD, this intervention produced improvements that are comparable to an in-person 9-week peer-delivered CBT intervention in Canada (Amani et al., 2021), as well as a 4-week technology-based peer-support intervention delivered in Singapore (Shorey et al., 2019). The impact was larger than the effects reported in two other large-scale PAI trials evaluating a behavioural intervention for PPD (Fuhr et al., 2019; Sikander et al., 2019), though these were conducted in low and middle-income countries whereas ours was conducted in the context of universally available healthcare.

Though smaller, it is important to note that participants in the control group also exhibited some improvement in the EPDS. This may be attributed to the changes in behaviour associated with being involved in a study, the anticipation of receiving the

intervention after the waitlist period, and/or receipt of multiple contacts from friendly study staff during a time of relative social isolation. Since we did not want to restrict maternal treatment (particularly because of the pandemic), control group participants could also access treatment as usual in the context of universal healthcare. As a result, participants could receive counselling and medications, both of which could have contributed to the improvements. Simple regression to the mean may also have contributed, as could history effects. While the size of the treatment effect in the experimental group were similar to another study of 1-day workshops delivered by experts earlier in the pandemic, the fact that the control group improved more in the present study suggest that conditions relating to the pandemic may have contributed to this. For example, relaxation of social distancing requirements may have led to more access to supports by participants and/or more ability to seek and receive care for PPD. Of course, these effects might also have been experienced by experimental group participants and so may also have inflated the size of the effect of the intervention.

Online peer-delivered workshops were also associated with improvements in postpartum anxiety, the most common comorbidity of PPD. The magnitude of the treatment effect is consistent with prior studies examining the impact of longer CBT protocols on perinatal anxiety in in-person and online formats (Li et al., 2022; Loughnan et al., 2019) and in-person 1-day CBT-based workshops for PPD delivered by experts (Van Lieshout et al., 2023). Although the workshops were not focused specifically on postpartum anxiety, it is likely that the CBT-based content of the intervention is capable of improving both depression and anxiety. Improvements in infant-focused anxiety were

also observed, similar to those reported in online 1-day CBT-based workshops for PPD delivered by experts (Van Lieshout et al., 2021). It is possible that mothers acquired skills (e.g., cognitive restructuring) that helped them cope with general anxiety and also enabled them to perceive and interact with their infants with reduced anxiety.

Reductions in parenting stress were also seen in the experimental group, which is supported by the findings of earlier trials evaluating the effects of psychotherapy on parental stress in those with PPD (Cuijper et al., 2021; Misri et al., 2006; Ngai et al., 2006; Forman et al., 2007; Pugh et al., 2016). A study conducted by Ngai and colleagues (2016) found that telephone-based CBT intervention for mothers at risk for PPD (EPDS $\geq$ 9) reduced parenting stress at 6 weeks and 6 months postpartum. Another RCT found that therapist-assisted internet-delivered CBT led to significant improvements in parental distress (Pugh et al., 2016). Though a strong association likely exists between PPD and parenting stress (Misri et al., 2006; Thomason et al., 2014; Sidor et al., 2011; Forman et al., 2007), there is still uncertainty regarding the directionality of this relationship (Thomason et al., 2014; Venkatesh et al., 2014). It is possible that our workshops had an indirect effect on parenting stress, with reductions in depressive symptoms mediating improvements in parenting stress. Others have also suggested that mothers with higher levels of parental stress experience lower self-efficacy and greater anxiety, predisposing them to depression (Venkatesh et al., 2014). This alternative unidirectional effect to explain the improvement in parenting stress in this study is possible, though less supported by the literature.

While improvements in infant positive affectivity (surgency) were reported, no statistically significant changes were observed in negative emotionality or regulatory capacity. Surprisingly few studies on PPD treatment have assessed impacts on infants (Tsivos et al., 2015; Verduyn et al., 2003), however, reports of improvements in infant outcomes post-intervention have been reported in earlier trials (Handley et al., 2017; Murray et al., 2003) while other showed no meaningful effects (Verduyn et al., 2003; Forman et al., 2007; Ammerman et al., 2015; Van Doesum et al., 2008). Improvements in depression post-workshops may have led mothers to be less anxious and more sensitive and receptive to the needs of their infants, leading to infants expressing more positive emotionality. It is possible that negative emotionality and regulatory capacity might require an intervention with a specific focus on infant-maternal bonding or infant outcomes, or that meaningful improvements might emerge after a longer period of maternal recovery from depression (Ammerman et al., 2015; Van Doesum et al., 2008; Forman et al., 2007). Nevertheless, the improvements seen in some infant outcomes post-workshop are important given the concern of intergenerational transmission of risk and should be further investigated.

The peer-delivered intervention evaluated in this study is brief, structured, and delivered online and in a group format, and may be capable of reducing barriers to treatment for PPD. The brief nature of this intervention makes it an ideal candidate for a low-intensity EBT for PPD to be integrated into the suggested stepped-care model. The peer-administered aspect can offset provider scarcity, and offer a more engaging and less costly treatment alternative. These workshops can enable those with PPD to receive

treatment from providers who truly understand their experiences and can validate their feelings, aiding in stigma reduction revolving around PPD treatment.

While the results of this study are promising, the limitations should be noted. First, our sample was relatively homogenous and primarily consisted of mothers who were white, married, and had access to universal healthcare. It is critical to confirm the generalizability of our findings to other settings by diversifying our recruitment geographics. Second, because of our intentionally inclusive eligibility criteria (EPDS score ≥10), it is possible that some participants did not meet the cut-off for being at risk for major depression. Third, all outcomes were based on maternal reports and so improvements in the mother-infant relationship and offspring outcomes are likely impacted by maternal symptom improvement. Furthermore, because we wanted to allow all enrolled participants to partake in our workshops, the waitlist control aspect may have inflated the observed effect size as participants in the waitlist control group anticipated treatment. Another limitation of our study is the short follow-up assessment, making it challenging to evaluate the durability of the effects and assess whether the outcomes that did not improve at 12 weeks can improve with more time. Lastly, we did not implement a formal assessment of intervention fidelity to confirm that outcome improvements are solely due to the intervention and to ensure consistent workshop delivery.

Given the high prevalence and low treatment rate of PPD, a novel intervention that is accessible, scalable, and in alignment with the treatment preferences of new mothers is needed. The online 1-day CBT-based workshops investigated in this study have the potential to reduce many of the practical treatment barriers associated with PPD,

including the need to travel and secure childcare. These workshops permit up to 30 mothers to participate at once, enabling more individuals to get treated. The peer-administered aspects could increase treatment engagements, resulting in more desirable clinical outcomes. Given the brief, low-resource and low-cost nature of these workshops, they could serve as a novel low-intensity EBT within the recommended stepped-care approach for treating PPD.

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Chapter 3: Discussions

Summary

Many treatment barriers still exist that interfere with those with PPD receiving the treatments they most want and need (psychotherapy). This thesis sought to determine the effectiveness of online 1-day peer-delivered group CBT-based workshops on reducing PPD symptoms and improving the common comorbidities and complications associated with PPD.

The findings of this study suggest that CBT-based workshops delivered by mothers who have recovered from PPD lead to clinically significant improvements in PPD symptoms. These workshops also led to a clinically significant reduction in anxiety symptoms, the most common comorbidly of PPD. Improvements were also observed in infant-focused anxiety, parental stress, and positive affect in infants post-intervention.

Interpretation

Task-shifting of psychotherapy from experts to those with less training has increasingly become viewed as an effective alternative to traditional psychotherapy (i.e., expert-delivered psychotherapy) (Hoeft et al., 2018), particularly for disorders with a high prevalence such as PPD (Singla et al., 2021; MacQueen et al., 2016). Not only has this redistribution of tasks led to clinically favourable outcomes in the PPD population, but it has also reduced various personal, practical, and systemic treatment barriers (Goodman, 2009; Gjerdingen & Yawn, 2007). When comparing the effect size of our PAI (d=0.92) to

those observed in prior expert-delivered CBT for perinatal depression trials, our effect was similar (Sockol, 2015).

When the size of the effect of our intervention is compared to other PAIs for PPD, it is comparable to some (Amani et al., 2021; Shorey et al., 2019) but greater than others (Fuhr et al., 2019; Sikander et al., 2019). It is important to note that the studies that yielded similar effect sizes to ours were also conducted in high-income countries (Amani et al., 2021; Shorey et al., 2019), whereas the ones with smaller effects were in low and middle-income countries (Fuhr et al., 2019; Sikander et al., 2019). Another difference between our study and the ones with lower effects is that the peers in the other trials did not report having lived experience with PPD (Fuhr et al., 2019; Sikander et al., 2019). Though the interventions in these other two trials were also structured (Fuhr et al., 2019; Sikander et al., 2019), it is possible that the lack of personal experience among the peers might explain their inferior effects relative to our study. Since we did not evaluate participants' perceptions of the peer aspect of the workshop in this study, we cannot definitively conclude the extent to which the lived experience of the peers contributed to our large observed effects. However, prior qualitative studies that investigated participants' perception of PAIs concluded that these interventions encompass an "in it together" theme, which is a vital facilitator of the favourable outcomes commonly observed (Rice et al., 2022).

Though clinical guidelines recommend a stepped-care approach to treat general depression and PPD, low-intensity EBTs for PPD are particularly scarce (NICE 2011). The brief, online, and group aspects of our intervention could make it an ideal candidate

for serving as a low-intensity intervention as the resources, cost, and risk are low. The magnitude of the effect of our intervention was supported by an earlier structured 1-day CBT for PPD trial, though the intervention was expert-delivered (Van Lieshout et al., 2021). Our effect size is also comparable to those seen in other 1-day CBT-based workshops for general adult depression (Brown et al., 2008), however, it is slightly larger than those seen in other brief workshops (Horrell et al., 2014; Brown et al., 2004). The slightly superior effect of our brief intervention compared to the others in general population samples (Horrell et al., 2014; Brown et al., 2004) may be due to our sample (those with EPDS scores of $\geq$10) and/or because it was peer-delivered. It is also possible that the brief, group CBT-based interventions are simply more effective for PPD due to significant associations between PPD and social support (Goodman & Santangelo, 2011; Letourneau et al., 2011), and these group workshops offer the social network that many mothers lack (Dennis, 2013; Letourneau et al., 2011). Overall, this intervention can be less restrictive and more economical, offering an engaging and systematic way to increase the number of individuals with PPD that receive help.

Future Directions

While the results of this RCT are promising, future research should be conducted to confirm the treatment effects and practical aspects of these brief online peer-delivered CBT-based workshops for PPD. Improvements can be made by i) advancing the study design, ii) diversifying our sample, iii) implementing a structured interview, iv) assessing

the mechanisms of treatment effect, and v) evaluating the cost-effectiveness of these workshops.

Future studies should build upon the findings of this thesis with an enhanced study design. A future trial with a "no-treatment" control group (while being able to receive TAU) should be conducted to confirm that comparable effects are observed. As waitlist control groups can overestimate effect sizes, we need to confirm the clinical efficacy with an alternative control group type, one that could provide a more accurate size of the effect. Furthermore, a longer follow-up assessment (e.g., 6 months) should be implemented to determine whether the clinical outcomes can be sustained. As PPD is known to affect individuals up to one year postpartum (O'Hara, 2013; O'Hara & Wisner, 2014), it is important to ensure intervention effects persist for a significant duration after intervention commencement.

A future study should also consider recruiting participants from a more diverse sociodemographic area and enhancing the methods with which outcomes are assessed. Significant differences exist in how PPD affects individuals across different ethnic backgrounds and the perception of PPD also differs across regions and healthcare systems (Slomian et al., 2019; Almond, 2009). It is therefore critical to evaluate the effect of this brief intervention in a more diverse sociodemographic area, potentially one where access to universal healthcare is not available, to confirm the generalizability of our findings. Furthermore, implementing more objective methods to assess the outcomes can enhance the reliability of the observed effects in this trial. Clinician-administered interviews such as the Mini International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998) can be

complementary to the questionnaires completed by participants and can provide an additional piece of information regarding potential diagnosis change (i.e., changes in depression and anxiety).

Evaluating the mechanisms of treatment effect and conducting subgroup analyses in a future study can aid in understanding why these workshops are so effective and who benefits most from them. Prior studies reported that peer-delivered interventions (Bryan & Arkowitz, 2015; Huang et al., 2020), online interventions (Berryhill et al., 2019; Roman et al., 2020), and brief, group interventions (Horrell et al, 2014; Brown et al., 2008; Van Lieshout et al., 2021) are effective for reducing depressive symptoms. Since our intervention has all of the aforementioned components, a future study should attempt to examine how each individual aspect contributes to mitigating PPD symptoms. For instance, it might be helpful to implement a group cohesion questionnaire, such as the Therapeutic Factors Inventory-8 (TFI-8), to assess individuals' perception of therapeutic factors in group settings (e.g., instillation of hope, social learning, etc.) (Tasca et al., 2016). To assess the extent to which the peer component contributes to the clinical effects, a questionnaire that measures the perception of alliance with the peer leaders could also be implemented, such as the Working Alliance Inventory (WAI-SR) (Munder et al., 2010). It would be useful for a future study to also conduct subgroup analyses to determine the difference in magnitude of effect observed depending on the severity of PPD at enrollment. Evaluating the mechanism of effect and conducting subgroup analyses can enable improvements to be made to further enhance the intervention and tell us more

about the types of individuals that might benefit most from our intervention, enabling a more effective and efficient way to allocate scarce resources.

Assessing the cost-effectiveness of this intervention is another future direction that can enhance our understanding of how this intervention might shift from research to practice with time. Prior studies have shown that brief (Horrell et al, 2014; Brown et al., 2008) and peer-delivered interventions (Singla et al., 2014; Huang et al., 2020; Dennis et al., 2009; Fuhr et al., 2019; Sikander et al., 2019) could be more cost-effective, however the magnitude of the cost-savings of our workshops is yet to be investigated. It would be beneficial to analyze the difference in costs between our workshops and TAU and to also evaluate the disease burden reported between the two groups by evaluating the quality-adjusted life year (QALY) (Petrou & Gray, 2011). This information could be particularly important for health economists and can assist in determining if and when this intervention could be integrated into the clinical setting.

Given the promising findings of this thesis, effective knowledge translation methods should be developed and implemented. After our findings are confirmed with additional RCTs, the next steps should entail sharing our findings with PPD communities, community and public health leaders, as well as psychiatrists, psychologists, and health economists. Considering the effectiveness of this intervention in the research context, the priority should be the mobilization of knowledge into postpartum care and its inclusion in practice guidelines. Sharing these results with the scientific and clinical sectors is a critical step in moving our promising findings from research to practice, and helping to address the low treatment rate of PPD in Canada and beyond.

Conclusions

When attempting to address the barriers associated with receiving treatment for PPD, an intervention that is safe, scalable, and aligns with the treatment preferences of mothers' needs is ideal. Not only is the scarcity of mental health professionals an ongoing concern (Byatt et al., 2012), but even where professionals are available to a limited few, mothers often prefer to receive help from providers whom they can trust and feel understood by (Hadfield et al., 2017; Dennis & Chung-Lee, 2006). The Peer-Delivered Online 1-Day CBT-Based Workshops evaluated in this thesis are effective and engaging and can increase the number of individuals that seek and receive treatment. Not only did this intervention lead to improvement in maternal outcomes, but it also positively impacted the infant, which is a key finding considering the plethora of evidence suggesting the intergenerational transmission of risk to infants raised by mothers with PPD (Letourneau et al., 2011; Goodman, 2019; Fitelson et al., 2010).

Considering that clinical practice guidelines recommend a stepped-care approach for treating PPD, this intervention can serve as a novel low-intensity EBT. The brief and online nature of these workshops makes treatment more accessible and feasible and may be the preferred therapy format considering mothers' busy schedules (Guille et al., 2013; Goodman, 2009). The group nature can broaden perceived social support, something that many mothers lack in the postpartum period (Goodman & Santangelo, 2011; Letourneau et al., 2011; Almond, 2009). Recovered PPD sufferers are plentiful and therefore can directly address the scarcity of professionals in a cost-effective way (Singla et al., 2014; Huang et al., 2020; Dennis et al., 2009; Fuhr et al., 2019; Sikander et al., 2019), allowing

professionals to treat more severe cases. Overall, the low-intensity PAI described in this thesis has the potential to enable a systematic way of treating those with PPD, make treatment more engaging, and provide equal opportunity to all PPD sufferers.

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