

2018

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## Recommended Citation

Cotellese, Christina M., "Is Electronically-Delivered Cognitive Therapy Effective in Producing Remission from Clinical Depression in Postpartum Women by 15 Weeks After Start of Treatment?" (2018). *PCOM Physician Assistant Studies Student Scholarship*. 352.  
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**Is Electronically-Delivered Cognitive Therapy Effective in  
Producing Remission from Clinical Depression in Postpartum  
Women by 15 Weeks After Start of Treatment?**

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies  
Philadelphia College of Osteopathic Medicine  
Philadelphia, Pennsylvania

December 15, 2017

## **Abstract**

**OBJECTIVE:** The objective of this selective Evidence Based Medicine (EBM) review is to determine whether or not, “Is electronically-delivered cognitive therapy effective in producing remission from clinical depression in postpartum women by 15 weeks after start of treatment?”

**STUDY DESIGN:** Review of three randomized controlled trials (RCTs).

**DATA SOURCES:** All studies were published in peer-reviewed journals found via the use of PubMed and Embase.

**OUTCOME(S) MEASURED:** The outcome measured was active or remissive diagnosis of postpartum depression. This was measured using either the SCID-IV to determine DSM-IV diagnosis or the Edinburg Postnatal Depression Scale.

**RESULTS:** Three randomized controlled trials were included and analyzed in this review. The study by Milgrom et al showed a statistically significant increase ( $p = 0.001$ ) in remission from clinical postpartum depression among patients receiving electronic cognitive behavioral therapy (CBT) through a program named MumMoodBooster compared to patients receiving treatment as usual, with a numbers needed to treat (NNT) of 2. The second study by Pugh et al demonstrated initial data with a p-value of 0.08, and follow up data showing a statistically significant increase ( $p < 0.01$ ) in remission from clinical postpartum depression among patients receiving electronic CBT via a website called Maternal Depression Online compared to wait list control patients, with an NNT of 5. The third study by O’Mahen et al showed a statistically significant increase ( $p < 0.001$ ) in recovery from postpartum depression among patients receiving electronic CBT through a program named Netmums compared to treatment as usual, with a NNT of 6.

**CONCLUSIONS:** The results of these randomized controlled trials indicate that electronically-delivered cognitive therapy is an effective treatment option for postpartum depression.

**KEY WORDS:** Postpartum Depression, Cognitive Behavioral Therapy, Internet

## INTRODUCTION

Postpartum depression (PPD), also known as postnatal depression, is a mood disorder that may affect women after childbirth, causing feelings of extreme sadness, anxiety, and exhaustion that may make it difficult to complete daily care activities.<sup>1</sup> An estimated 11-20% of women who give birth each year have PPD symptoms, resulting in an estimated 600,000-800,000 women who experience PPD each year.<sup>2</sup> While the specific costs of PPD to healthcare are unknown, the annual cost of not treating a single mother with PPD amounts to \$7,200, totaling \$5.7 billion across the PPD population in lost income and productivity. Additionally, childbirth-related hospitalizations for women suffering from PPD amount to another \$15 billion. Although it is uncertain how many healthcare visits each year are attributable to PPD, only 15% of women suffering from PPD ever receive treatment for their depression. Furthermore, women suffering from PPD are at higher risk for serious consequences, including suicide. Their children are also at risk of homicide, long-term effects on emotional behavior and cognitive skills, as well as impaired maternal-infant bonding.<sup>3</sup>

PPD likely does not have a single cause, but instead results from a combination of physical and emotional factors. Changing hormone levels in the postpartum period contribute to mood swings, and many mothers cannot get adequate rest after childbirth. Other risk factors include previous depression or family history of depression, financial problems, isolation, and lack of social support. Common symptoms include feeling sad, hopeless, or overwhelmed, feeling overly anxious, sleep disturbances, trouble concentrating and making decisions, anhedonia, aches and pains, persistent doubt in the ability to care for the baby, and thinking about harming oneself or the baby.<sup>1</sup>

When treating PPD, traditional management generally begins with counselling or therapy, which may be cognitive behavioral or interpersonal in nature. Cognitive behavioral therapy is a type of treatment that focuses on discovering and challenging negative patterns of thought an individual experiences that affect their outlook on themselves and their lives. Interpersonal therapy centers on solving interpersonal problems to achieve symptom recovery. Typically, these methods are explored for treatment of PPD before initiation of pharmacologic management. If therapy is not successful, however, certain antidepressants may be administered. These include medications such as Fluoxetine, Paroxetine, Sertraline, and Amitriptyline.<sup>1</sup>

These treatment options are generally effective in producing remission from PPD; however, their efficacy, especially that of cognitive therapy, depends largely on adherence to treatment, which relies on the ability of the patient to attend therapy sessions. Postpartum women are understandably a particularly difficult population in which to achieve the type of adherence needed for therapy to be fully effective. Not only are these patients the mothers of newborns and possibly of older children as well, which limits their free time significantly, but they may be single mothers unable to leave their child to attend therapy, or their symptoms may be so severe that they feel incapable of leaving their homes. These and other factors are what make electronically-delivered cognitive behavioral therapy a potentially positive option for women suffering from PPD.

In postpartum women, electronically-delivered cognitive behavioral therapy may be effective in producing remission from PPD by improving access and subsequent adherence to treatment. By allowing patients to complete therapy comfortably in their homes and interactively over the Internet, rather than requiring them to inconvenience their already difficult daily activities to leave their homes and visit a medical office, electronically-delivered cognitive

therapy may provide the accessibility and level of comfort that these patients need to better achieve remission from their condition.

### OBJECTIVE

The objective of this selective Evidence Based Medicine (EBM) review is to determine whether or not “Is electronically-delivered cognitive therapy effective in producing remission from clinical depression in postpartum women by 15 weeks after start of treatment?”

### METHODS

Participants in each study used in this EBM review were postpartum women 18 years of age and older with an infant born in the last 12 months and who have been diagnosed with postpartum depression. The intervention in each study was electronically-delivered cognitive behavioral therapy. The comparison in Milgrom et al and O’Mahen et al was treatment as usual, and the comparison in Pugh et al was waitlist control.<sup>4,5,6</sup> The outcome measured was remission from clinical depression. This review included three randomized controlled trials (RCTs).

All three articles were researched via PubMed and Embase. Key words in the searches included “postpartum depression,” “cognitive behavioral therapy,” and “electronic.” All three articles were published in English and contained published data. Articles were selected based on relevance and that the outcomes of the studies mattered to patients (POEMs). Inclusion criteria for all three articles were RCTs published after 2007. Exclusion criteria were patients under 18 years old, patients at risk for suicide, current active treatment for depression, current substance abuse, and depression with psychotic features. The statistics reported in each article included NNT, p-value, or OR. **Table 1** demonstrates the demographics of the studies included in this EBM review.

**Table 1:** Demographics and Characteristics of Included Studies

Study	Type	# Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Milgrom <sup>4</sup> (2016)	RCT	43	30	≥18 years old; Australian; <1 year postpartum; Internet access with email use; EPDS score of 11-23; no current treatment for depression; score of <3 on item #10 of EPDS	Suicide risk; substance abuse; current or past manic/hypomanic episodes, PTSD; alcohol use or dependence; depression with psychotic features; current treatment for depression	2	An Internet-based cognitive therapy, Mum Mood Booster
Pugh <sup>5</sup> (2016)	RCT	44	18 or older	Resident of Saskatchewan, Canada; ≥18 years old; <1 year postpartum; access to and comfort using computer/Internet; score ≥10 on EPDS; not receiving other psychotherapy; any medications at stable dose for >1 month; no past or present psychotic mental illness, bipolar disorder, or current suicide plan or intent	Did not meet PPD inclusion criteria; declined participation; recently had a change in medication	3	Therapist-Assisted Internet-Delivered Cognitive Behavior Therapy called Maternal Depression Online
O'Mahen <sup>6</sup> (2013)	RCT	910	18 or older	Member of NetMums; ≥18 years old; depressive symptoms; <1 year postpartum; score of ≥12 on EPDS	Did not meet clinical standard for depression	567	An Internet-based behavioral therapy, NetMums

## OUTCOMES MEASURED

The chief outcome measured in all three selected studies was remission from clinical depression following the intervention. Milgrom et al used the SCID-IV to determine DSM-IV diagnosis of major or minor depression.<sup>4</sup> Both Pugh et al and O'Mahen et al used the Edinburgh Postnatal Depression Scale to assess a diagnosis of postpartum depression.<sup>5,6</sup>

## RESULTS

Three RCTs were considered in this review. Milgrom et al and O'Mahen et al compared electronically-delivered cognitive therapy to treatment as usual in women suffering from postpartum depression, and Pugh et al compared the same to a waitlist control. Women who were under 18 years of age, at risk for suicide, undergoing active treatment for their depression, current substance abusers, and experiencing depression with psychotic features were excluded from the studies.<sup>4,5,6</sup> Study participants presented with clinical postpartum depression and received the intervention via the Internet.

The study by Milgrom et al<sup>4</sup> recruited 178 women in Australia between March 2013 and July 2014. Participants were recruited via advertising campaigns using Google AdWords, Facebook, and Twitter, and the study was also advertised to Maternal and Child Health Centers in Melbourne. At the end of recruitment, 43 mothers were randomized to either the treatment condition, an Internet program called MumMoodBooster, or to the treatment as usual (TAU) condition. Twelve weeks after enrollment, two women in the treatment condition failed to complete the necessary questionnaires and telephone interviews. In the treatment group, 20 of 21 women were diagnosed with current major depression and 1 with minor depression. In the TAU group, 20 of 22 women were diagnosed with current major depression and 2 with minor depression. Women in the treatment group participated in MumMoodBooster, a cognitive-

behavioral therapy Internet program consisting of 6 interactive sessions. Women in the TAU group formed a collaborative care plan with a Maternal and Child Health Nurse (MCHN) or general practitioner (GP), and therefore their treatment varied depending on their chosen provider. By the conclusion of the study, of the women in the MumMoodBooster condition, 15 out of 19 (79%) no longer met DSM-IV criteria for depression at 12 weeks, compared to 4 out of 22 (18%) in the TAU group who no longer met DSM-IV criteria. The difference in remission rate between the two groups was determined to be statistically significant with a p-value of 0.001. The numbers needed to treat (NNT) was 2, indicating that 2 people need to be treated for one person to achieve remission compared to control.

The Pugh et al study<sup>5</sup> recruited 56 participants from Saskatchewan, Canada between March 2012 and February 2013. Recruitment efforts involved notifying physicians, perinatal nurses, and the public via posters, informational cards, Internet advertisements, and media interviews. Initial screening used the Edinburgh Postnatal Depression Scale (EPDS), on which scores range from 0 to 30. Eligible participants were required to score at least a 10 to be included in the study. Of the 56 initially accepted, 6 were considered ineligible, either because they did not meet inclusion criteria (n = 2), they declined participation (n = 1), or recently changed their medication (n = 3). Equal numbers of participants were randomized to either the treatment or wait list control (WLC) group. Women in the treatment group participated in an Internet-based cognitive therapy called Maternal Depression Online, which consisted of 7 modules. Women in WLC were provided informational pamphlets. By the end of the study, 3 participants withdrew from the program. At 10-week follow-up, 65% of women in the Maternal Depression Online condition were considered recovered, whereas 38% in the WLC were recovered. At this point the difference between the two conditions was not statistically

significant with a p-value of 0.08. Another 4 weeks after this 10-week follow-up, investigators collected an additional EPDS score, whose results suggested a statistically significant difference between the two conditions with a p-value  $< 0.01$ . Thus, intervention effects were maintained and intervention participants continued to improve. The NNT was 5, thus 5 individuals must be treated for one person to achieve remission compared to control.

The third study by O'Mahen et al<sup>6</sup> recruited 1261 women between September 2009 and January 2010, 910 of which met the required EPDS score of  $>12$ . Recruitment was accomplished via advertisements on websites and through the Netmums newsletter. Participants were randomized into either the Netmums condition or treatment as usual (TAU) condition. The treatment group participated in an Internet-based cognitive therapy called Netmums, which consisted of 11 weekly sessions completed over a 15-week period. The TAU group could vary by type of treatment. By 15-week follow-up, 181 of 462 (39%) of the participants in the treatment group and 162 of 448 (36%) of participants in the TAU group completed a post-treatment EPDS. At this time, 115 of 181 (63%) of women in the treatment group were counted as non-depressed (EPDS  $<12$ ) and 71 of 162 (43.8%) of women in the TAU group were counted as non-depressed. There was a statistically significant difference between groups with a p-value  $< 0.001$ . The odds ratio (OR) was 2.16, suggesting that exposure to the intervention was associated with higher odds of remission. When non-respondents were counted as depressed, 115 of 461 (24.9%) in the treatment group were non-depressed, while 71 of 448 (15.8%) in the TAU group were non-depressed. This data was statistically significant with a p-value of 0.001. The NNT was 6, thus 6 people must be treated for one person to achieve remission compared to control.

**Table 2** provides the statistics reported in each of the studied included in this review.

**Table 2:** Efficacy of Internet-delivered cognitive behavioral therapy in producing remission from postpartum depression

<b>Study</b>	<b>CER</b>	<b>EER</b>	<b>RBI</b>	<b>ABI</b>	<b>NNT</b>	<b>P value (95% CI)</b>
Milgrom <sup>4</sup>	18%	79%	3.38	61%	2	0.001
Pugh <sup>5</sup>	38%	62%	0.63	24%	5	10 weeks: 0.08 14 weeks: <0.01
O'Mahen <sup>6</sup>	43.8%	63%	0.49	19.2%	6	<0.001; OR=2.16

## DISCUSSION

This EBM review analyzed 3 RCTs that explored the efficacy of Internet-delivered cognitive behavioral therapy in producing remission from PPD in postpartum women. The study by Milgrom et al<sup>4</sup> achieved 79% remission from PPD in its MumMoodBooster condition, compared to 18% in its TAU condition. Also, according to the authors, this study was the first of its kind to evaluate its intervention against DSM-IV diagnostic criteria. There were, however, several limitations to this study. One of the biggest limitations was the relatively small sample size, which may make it difficult to generalize the results to a larger population. In addition, women in the TAU condition reported high levels of alternative help seeking, which may have made it difficult to detect true treatment effects in this condition. Furthermore, all participants in this study were Australian residents, which raises the question of generalizability to women of other nationalities and in other countries.

In the study by Pugh et al<sup>5</sup>, although at 10-week follow-up the difference between the two conditions did not technically reach statistical significance ( $p = 0.08$ ), by 14-week follow-up, the new  $p$  value of  $p < 0.01$  indicated that not only were intervention effects maintained over these 4 additional weeks, but that the intervention participants continued to improve. There were several limitations to this study. The sample size was relatively small, and the lack of an active control condition could have exaggerated the results. Additionally, this study was considerably limited

by recruiting women from only one specific town in Canada, which makes its generalizability difficult to determine.

The study by O'Mahen et al<sup>6</sup> reported that 63% of its treatment condition participants achieved remission from PPD, compared to 43.8% of the TAU condition. Of the 3 studies included in this review, this study is perhaps the most difficult to truly interpret due to the considerably large quantity of participants who discontinued treatment by 15-week follow-up, and the large number who failed to respond to follow-up EPDS and were therefore counted as depressed. Although in counting these participants as depressed the authors were still able to achieve statistical significance with their intervention, they also mention that PPD is often a spontaneously remitting condition, and therefore counting all non-responders as depressed may have been inaccurate as a description for these participants. Thus, adherence to treatment and to follow-up correspondence was a large limitation in this study, though the authors were still able to prove a statistical significance between their intervention and control conditions.

Since the passing of the Mental Health parity law in the United States in 2008, federal law has required health insurance companies provide mental health coverage that is comparable to physical health coverage.<sup>7</sup> Though the type of psychotherapy covered may differ from one insurance company to another, in general, health insurance can be expected to help with the costs of cognitive behavioral therapy. There is an added level of complexity concerning the fact that the intervention in this EBM review is electronically-delivered cognitive behavioral therapy. However, if this intervention may be considered a type of telepsychiatry, 32 states have already passed legislation requiring private insurance to cover telemedicine, and so it may just be a matter of deciding where in the health insurance domain this intervention belongs.<sup>8</sup>

## CONCLUSIONS

The studies analyzed in this EBM review suggest that electronically-delivered cognitive behavioral therapy is effective in producing remission from clinical postpartum depression by 15 weeks of treatment. Though sample sizes were small in the Milgrom et al<sup>4</sup> and Pugh et al<sup>5</sup> studies, and the O'Mahen et al<sup>6</sup> study experienced large participant drop-out or failure to respond to final EPDS scoring, each study demonstrated a statistically significant increase in remission rates among intervention condition participants in comparison to the control conditions.

Clinically, the Milgrom et al<sup>4</sup> study was the most significant when considering its NNT of 2, compared to Pugh et al<sup>5</sup> and O'Mahen et al<sup>6</sup>, with NNTs of 5 and 6, respectively. The Milgrom et al<sup>4</sup> study also demonstrated the highest absolute benefit increase (ABI) of 61% compared to Pugh et al<sup>5</sup> and O'Mahen et al<sup>6</sup>, whose studies had an ABI of 24% and 19.2%, respectively.

Thus, although each study did reach statistical significance, Milgrom et al may have been the most significant clinically, with the lowest NNT and highest ABI.

Future studies should attempt to compare electronically-delivered cognitive behavioral therapy with consistent face-to-face cognitive behavioral therapy. None of the 3 studies included in this EBM review compared the intervention condition to a consistently similar therapeutic intervention, and doing so may help to determine if an electronic form of cognitive behavioral therapy would truly benefit women with PPD compared to traditional forms of treatment. Future studies may also investigate how to best maintain participant engagement and prevent early withdrawal from the program.

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