Treating Depression During Pregnancy and the Postpartum: A Preliminary Meta-Analysis

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Objectives: This meta-analysis evaluates treatment effects for nonpsychotic major depression during pregnancy and postpartum comparing interventions by type and timing. Methods: Studies for decreasing depressive severity during pregnancy and postpartum applying treatment trials and standardized measures were included. Standardized mean differences were calculated for continuous variable outcome data. Results: Thirteen interventions reported positive effect sizes, one reported marginally positive effect size, one reported no effect, and the remaining reported marginally negative effect size. By type of treatment, medication with cognitive behavioral therapy (CBT; 3.871, $p < .001$*) and medication alone (3.048,* $p < .001$*) reported largest effect size, followed by group therapy (CBT, educational, and transactional analysis; 2.045,* $p < .001$*), interpersonal psychotherapy (1.260,* $p < .001$*), CBT (.642,* $p < .001$*), psychodynamic (.526,* $p = .014$*), counseling (.418,* $p = .014$*), and educational (.100,* $p = .457$*). Postpartum implementation produced larger effect size (.837,* $p < .001$*) than implementation during pregnancy (.377,* $p = .002$*). When medication interventions are excluded, postpartum effect size is .704 (*$p < .001$*). Conclusions: Preliminary findings suggest medication, alone or with CBT; group therapy with CBT, educational, and transactional analysis components; interpersonal psychotherapy; and CBT produce largest effect sizes in this population among interventions tested.*

Keywords: *depression; pregnancy; postpartum; treatment; meta-analysis*

Depression during pregnancy and the postpartum is a widespread, serious health problem for women and infants. Approximately 10% of women develop nonpsychotic maternal postpartum depression following delivery (Cooper, Campbell, Day, Kennerley, & Bond, 1988; Cooper, Murray, Wilson, & Romaniuk, 2003; Cox, Holden, & Sagovsky, 1993; O'Hara & Swain, 1996). A recent study of depression during pregnancy and the postpartum has documented that in a cohort of 1,400 women, 13.5% met criteria for major depression at 32 weeks of pregnancy and 9.1% met criteria at 8 weeks postpartum (Evans, Heron, Francomb, Oke, & Golding, 2001). Similar rates of major and minor depression were found in middle-income women and predominantly Latina women (Yonkers et al., 2001) during pregnancy: 9% to 10% (Gotlib, Whiffen, Wallace, & Mount, 1991; O'Hara, Neunaber, & Zeboski, 1984). Higher rates (26%), however, have been identified in low-income, urban, African American and Caucasian women (Hobfoll, Ritter, Lavin, Hulszier, & Cameron, 1995).

Nonpsychotic postpartum depression has harmful, lasting effects on infant and child well-being (Moore, Cohn, & Campbell, 2001; Murray & Cooper, 1997), on the mothers' and fathers' subsequent mental health (Areias, Kumar, Barros, & Figueiredo, 1996; Kumar & Robson, 1984), and on the quality of the couple's relationship (Campbell, Cohn, Flanagan, Popper, & Meyers, 1992; O'Hara, 1994). Additionally, depression during pregnancy has been demonstrated repeatedly to be the most powerful predictor of postpartum depression (O'Hara & Swain, 1996). Evidence also suggests that depression during pregnancy results in adverse outcomes for mother and fetus or infant well-being. Higher levels of anxiety and stress are associated with maternal depression and predict dysregulation of hypothalamic-pituitary-adrenal axis in the fetus (Sandman et al., 1994), low birth weight, and prematurity (Wadwha, Sandman, Porto, Dunkel-Schetter, & Garite, 1993). Furthermore, infants of

Authors' Note: This work was supported by the National Institute of Mental Health Grant 5T32MH014623-24 (S. E. Bledsoe) and National Institute of Mental Health Grant K23 MH67595 (N. K. Grote). The author would like to thank Jennifer Bellamy and Edward Mullen for their assistance with this project. Correspondence should be addressed to Sarah E. Bledsoe, MSW, seb2108@columbia.edu, Columbia University School of Social Work, c/o Doctoral Program, 1255 Amsterdam Avenue, New York, NY 10027.

Research on Social Work Practice, Vol. 16 No. 2, March 2006 109-120
DOI: 10.1177/1049731505282202

mothers depressed during pregnancy exhibit substandard neuromotor performance (Lundy et al., 1999) and dysregulation in behavior, physiology, and biochemistry (Field, 2000).

Although women are not more vulnerable to depression during pregnancy and the postpartum than at any other points across the life span (Gotlib, Whiffin, Mount, Milne, & Cordy, 1989; Kumar & Robinson, 1984; O'Hara, Zekoski, Philipps, & Wright, 1990), this period may be critical because of the risk posed to the fetus or infant as well as the mother and other family members. Furthermore, pregnant women may be unusually open to interventions directed at improving their own mental health before the birth of their child (Cowan & Cowan, 2000), and pregnancy is known to be an opportune time for suggesting health interventions (Institute of Medicine, 1996). It is imperative that doctors, clinicians, and social workers be provided with evidence regarding the treatment of depression during pregnancy and the postpartum on which to base best-practice decisions. Higher rates of depression during pregnancy and the postpartum among low-income, urban women may create a special relevance for social work practitioners. Treatment that reduces maternal depression may offer protective advantages, not only for the woman herself but also for the fetus, infant, and other family members (Kaplan, Bachorowski, Smoski, & Hudenko, 2002; Orr, James, & Prince, 2002; Sanderson et. al, 2002; Susman, Trickett, Iannotti, Hollenbeck, & Zahn-Waxler, 1985; Zuravin, 1989).

The following interventions for nonpsychotic major depression are included in this review based on their use in treatment trials: (1) medication in combination with cognitive behavioral therapy (CBT); (2) medication; (3) group therapy with cognitive behavioral, educational, and transactional analysis components; (4) interpersonal psychotherapy (IPT); (5) CBT; (6) psychodynamic therapy; (7) counseling; and (8) educational interventions. IPT, used in four studies, is a time-limited, manualized treatment for depression focused on interpersonal problems related to the onset of the current episode of depression (Klerman, Weissman, Rounsaville, & Chevron, 1984). All four studies using this approach modified IPT to address the particular needs of women with major depression during pregnancy or postpartum (Grote, Swartz, Bledsoe, & Frank, 2004; O'Hara, Stuart, Gorman, & Wenzel, 2000; Spinelli, 1997; Spinelli & Endicott, 2003). CBT was used in three studies. CBT is a manualized form of psychotherapy focused on enhancing cognitive skills, evaluating and modifying dysfunctional thoughts, encouraging self-reinforcement, generating positive coping statements, developing problem-solving abilities, and improving social skills (Appleby, Warner, Whitton, & Faragher, 1997; Beck, Rush, Shaw, & Emery, 1979; Chabrol et al., 2002; Cooper et al., 2003; D'Zurilla, 1986). One study used a psychodynamic approach focused on the early attachment experiences, mother's representation of the infant, and the mother-infant relationship (Cooper et al., 2003; Cramer et al., 1990; Stern, 1995). Two studies provided counseling interventions where women were given an opportunity to raise any personal or infant-care concerns (Cooper et al., 2003; Holden, Sagovsky, & Cox, 1989). A group intervention with a cognitive behavioral component, an educational component and a transactional analysis component was employed by Lane, Roufeil, Williams, and Tweedie (2001). Two studies used educational interventions to address major depression during pregnancy and the postpartum. These interventions were tailored to the educational needs of pregnant and postpartum women and focused on topics such as parenting education and perinatal depression (Hayes, Muller, & Bradley, 2001; Spinelli, 2003). Two studies used antidepressant medications (fluoxetine and fluvoxamine) to treat postpartum depression (Appleby et al., 1997; Suri, Burt, Altshuler, Zuckerbrow-Miller, & Fair, 2001). One study included an intervention that combined medication with CBT (Appleby et al., 1997).

The primary aim of this review is to evaluate the effects of current treatment interventions for nonpsychotic major depression during pregnancy and the postpartum. A second aim is to compare the relative effect sizes of the different types of interventions for nonpsychotic major depression during pregnancy and the postpartum to determine which treatments appear to be most effective. A third and final aim is to evaluate the effect of the timing (during pregnancy or postpartum) of the interventions targeting nonpsychotic major depression. In examining and synthesizing the available evidence relevant to these specific aims, this review contributes to the literature available to social work practitioners and other professional clinicians working with pregnant or postpartum women who desire to make evidence-based, best-practice decisions.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of Studies, Participants, Interventions, and Outcome Measures

All treatment trials that evaluated interventions directed at treating women with nonpsychotic major depression during pregnancy and the postpartum that used either a randomized controlled trial or a pretest, posttest (without comparison or control group) were sought for the purposes of this review. Because of the limited number of trials focusing on depression during pregnancy and postpartum the decision was made to include both randomized controlled trials and nonrandomized studies (but limited to those with a pretest, posttest design) in this meta-analysis. Only studies with participants who were women diagnosed with nonpsychotic major depression during pregnancy or the postpartum were selected for inclusion in this review. The review was further limited to studies using interventions designed to treat nonpsychotic major depression during pregnancy or the postpartum. A standardized measure of depressive symptomatology was the main outcome measure.

SEARCH STRATEGY FOR IDENTIFICATION OF STUDIES

Electronic searching, reference searching, and personal contact were used to identify studies for inclusion in this review. Relevant treatment trials were identified by searching the following electronic databases using the following terms: *depression*, *treatment* or *clinical trials* or *trials*, and *postpartum* or *pregnancy* or *postnatal*. Terms such as *interpersonal psychotherapy* or IPT, *education*, *cognitive behavioral* or CBT, *Group* (cognitive behavioral, educational, and transactional analysis components), and *medication* were used to ensure that additional trials were not overlooked. This search was also limited to studies published in the past 15 years to increase relevance to current clinical practice (Weissman & Sanderson, 2002). Four databases were used in electronic searching: Cochrane Central Register of Controlled Trials, Medline, Psychlit, and Social Work Abstracts. The reference lists of all papers selected were inspected for further relevant studies. Additionally, personal contact resulted in the inclusion of one article that has been recently published.

METHODS OF THE REVIEW

Selection of Studies

The entire search was performed by two reviewers. All studies were evaluated according to the above criteria. Studies not meeting the above criteria were discarded and only those studies that met the criteria of being treatment studies for nonpsychotic depression during pregnancy or the postpartum were retained. Authorship was not concealed at the point of data collection.

Quality Assessment

Studies were given a quality rating of high, medium, or low based on the following criteria: presence of randomization, presence of a control group, number of participants, and year of publication. The rating scale was entered into the analysis as a grouping variable.

Data Extraction and Management

All data were extracted by one reviewer. Studies that met the inclusion criteria regarding the targeted outcome (reduction of depressive symptomatology) were reported as detailed in the *Type of Outcome* section. Reported analyses include only participants who completed the intervention. We report the attrition rate for each study in Appendix A. Although some studies provide follow-up data, follow-up data were not included in the meta-analysis.

Comprehensive Meta Analysis software (Borenstein & Rothstein, 1999) was used to assess continuous outcome data with a 95% confidence interval. Data were reported as presented in the original studies with no exceptions. Analysis of interventions by type of treatment is also presented. Type of treatment data were retrieved from the published studies. Timing of intervention implementation is also presented. Studies were divided into two categories based on the reported start time of intervention: (a) pregnancy (for interventions implemented before the birth of the child) and (b) postpartum (for interventions implemented after the birth of the child). For more detail see Appendix A.

DESCRIPTION OF STUDIES

Included, Excluded, and Ongoing Studies

Eleven studies describing 16 intervention trials met inclusion criteria for the review (see Appendix A for more details about the studies). Eight identified studies were excluded from the review (see Appendix B). Three studies were prevention studies, and all participants did not meet criteria for major depression at prevention implementation. One study did not focus specifically on women during pregnancy and the postpartum. Data reported specifically on women during pregnancy and the postpartum could not be separated from the study sample based on information in the study publication. Two studies did not focus on depression as the outcome measure. One study was excluded because the type of intervention—early, middle, or late-night sleep deprivation—was not easily compared to the interventions included in this analysis. One study was excluded because it had a sample size of one (see Appendix B). One ongoing study was identified. This study was a randomized, controlled treatment trial testing IPT in a low-income population of pregnant women. Because outcome data were not available at the time of this review, the study is not included. However, it has been identified for inclusion in future reviews.

Interventions

All interventions were designed to treat nonpsychotic depression during pregnancy and the postpartum. The treatments are classified as follows for further analysis: IPT, CBT, psychodynamic therapy, counseling, educational, group therapy with cognitive behavioral, educational, and transactional analysis components, medication, and medication in combination with CBT.

Outcome Scales

Depressive symptomatology was measured using one of the following standardardized inventories or standardized interviews (see Appendix A for the measures used in each study). Rating scales used to measure clinical outcomes are the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987), Hamilton Rating Scale for Depression (Hamilton, 1960), and Profile of Mood States (McNair, Lorr, & Droppleman, 1981). Because the EPDS was designed to differentiate the symptoms of depression from the somatic symptoms of pregnancy (Cox et al., 1987), we chose it as the primary outcome measure for the meta-analysis. For studies that did not include the EPDS as a measure of depressive symptomatology, we chose the Hamilton Rating Scale for Depression that was used in one study, and the Profile of Mood States, which was the only measure of depressive symptoms used in another study.

Methodological Quality

A relatively simple method was used to determine the quality of studies. Studies were given a quality rating of high, medium, or low based on the following criteria: presence of randomization, presence of a control group, number of participants, and year of publication. Randomization in each of the trials was assessed using the following scale: 1 = *randomized*, 2 = *not randomized*. Studies were ranked on the presence or absence of a control group using the following scale: 1 = *control group present*, 2 = *no control group*. All studies falling into the second category used a pretest, posttest design to measure depressive symptomatology before and after intervention. Studies were ranked based on the number of participants using the following scale: 1 = *more than 30 participants*, 2 = *less than 30 participants*. Interventions of 30 or more scored more favorably because of the likelihood of greater generalization for trials including 30 or more participants. Studies were ranked based on year of publication using the following scale: 1 = *less than 10 years from date of publication*, 2 = *10 to 15 years from date of publication*. The cutoff for year of publication was chosen based on relevance to current clinical practice as there has been an increase in evidence for the efficacy of interventions in mental health based on controlled clinical trails in the past decade (Weissman & Sanderson, 2002).

Studies were given the following quality rankings based on the above criteria.

High: Appleby et al., 1997; Cooper et al., 2003; Hayes et al., 2001; O'Hara et al., 2000; and Spinelli et al., 2003.
Medium: Chabrol et al., 2002; Grote et al., 2004; Holden et al., 1989; Lane et al., 2001; and Spinelli, 1997.
Low: Suri et al., 2001.

RESULTS

The first objective of this review was to evaluate the effects of current evidence-based treatments for nonpsychotic major depression during pregnancy and the postpartum (see Table 1). Eleven studies provided 16 treatment trials with a total of 922 participants contributing to this analysis. The overall effect size of all interventions in the analysis was .673 ($p < .001$). Of the 16 interventions compared, 14 interventions from the 11 studies included in the review had a positive effect size. Of the 16 interven-

TABLE 1: ***Meta-Analysis: All Interventions Ranked by Effect Size***

Study	*Type of Intervention*	*Timing of Intervention*	*Number of Participants*	*Effect Size (–8 to 8)*	p *Value*
Appleby, Warner, Whitton, and Faragher (1997)	Medication + CBT	Postpartum	30	3.871	< 0.001
Appleby et al. (1997)	Medication	Postpartum	33	4.781	< 0.001
Grote, Swartz, Bledsoe, and Frank (2004)	IPT-B	Pregnancy	18	2.178	< 0.001
Chabrol et al. (2002)	CBT	Postpartum	48	2.109	< 0.001
Lane, Roufeil, Williams, and Tweedie (2001)	Group[a]	Postpartum	30	2.046	< 0.001
Spinelli (1997)	IPT	Pregnancy	26	1.598	< 0.001
Suri, Burt, Altshuler, Zuckerbrow-Miller, and Fair (2001)	Medication	Postpartum	12	1.473	0.020
O'Hara, Stuart, Gorman, and Wenzel (2000)	IPT	Postpartum	99	1.193	< 0.001
Spinelli and Endicott (2003)	IPT	Pregnancy	38	0.955	0.005
Holden, Sagovsky, and Cox (1989)	Counseling	Postpartum	50	0.747	0.010
Spinelli and Endicott (2003)	Education	Pregnancy	34	0.693	0.047
Cooper, Murray, Wilson, and Romanuik (2003)	Psychodynamic	Postpartum	95	0.526	0.011
Cooper et al. (2003)	CBT	Postpartum	92	.434	0.039
Cooper et al. (2003)	Counseling	Postpartum	97	0.259	0.202
Hayes, Muller, and Bradley (2001)	Education	Pregnancy	188	0.000	1.00
Appleby et al. (1997)	CBT	Postpartum	92	–0.099	0.777
Total			922	0.673	< 0.001

NOTE: CBT = cognitive behavioral therapy; IPT-B = brief interpersonal psychotherapy; IPT = interpersonal psychotherapy.
a. Group therapy with cognitive behavioral, educational, and transactional analysis components.

TABLE 2: ***Meta-Analysis: All Interventions Grouped by Intervention Type***

Type of Intervention	*Number of Intervention Trials*	*Number of Participants*	*Effect Size*	p *Value*
Medication + CBT	1	30	3.871	< .001
Medication	2	45	3.048	< .001
Group[a]	1	30	2.046	< .001
IPT	4	181	1.260	< .001
CBT	3	172	0.642	< .001
Psychodynamic	1	95	0.526	.014
Counseling	2	147	0.418	.014
Educational	2	222	0.100	.457

NOTE: CBT = cognitive behavioral therapy; IPT = interpersonal psychotherapy.
a. Group therapy with cognitive behavioral, educational, and transactional analysis components.

tions, 8 had effect sizes between 1.193 and 4.718 ($p <$ .020). Five had effect sizes between .434 and .955 ($p <$ .047). None of the final 3 interventions (counseling—Cooper et al., 2003; educational—Hays et al., 2001; CBT—Appleby et al., 1997) showed any significant effect size.

The second objective was to compare the relative effectiveness of treatments for nonpsychotic major depression during pregnancy and the postpartum. For this analysis, studies were grouped according to type of treatment intervention (see Table 2). From the 16 treatment trials, treatments were categorized into eight intervention types. Of the eight interventions types compared, four had positive effect sizes between 1.260 and 3.871 ($p < .001$). Of the 8 interventions types, three had effect sizes between .418 and .642 ($p < .014$). The final intervention type (educational) did not show any significant effect size. The results in Table 3 are shown by treatment intervention and ranked from highest to lowest by effect size.

The third objective was to evaluate the effect of the timing of the implementation (during pregnancy or postpartum) of interventions targeting nonpsychotic major depression (see Table 3). For this analysis, interventions were grouped according to the timing of the implementation of the intervention. Of the 16 interventions, 11 were implemented after diagnosis of nonpsychotic major depression the postpartum period. For this group, $N = 618$ and effect size = .837, ($p < .001$). The remaining 5 interventions were implemented during pregnancy after the diagnosis of nonpsychotic major depression. For this group, $N = 304$ and effect size = .377 ($p = .002$). To determine whether inclusion of medication in postpartum interventions was responsible for the difference in effect size between interventions begun during pregnancy and those initiated postpartum, a second analysis was run. In this analysis, the 3 interventions using medication to treat depression postpartum were removed from the analysis. When treatments using medication were eliminated, the

TABLE 3: ***Meta-Analysis: All Interventions Grouped by Timing of Implementation of Intervention***

Timing of Intervention	*Number of Intervention Trials*	*Number of Participants*	*Effect Size*	p *Value*
Postpartum				
Analysis 1	11	618	.837	< .001
Analysis 2	8	256	.703	< .001
Pregnancy	5	304	.377	.002

postpartum effect size decreased from .837 to .703, $p <$ .001 ($N = 256$).

DISCUSSION AND APPLICATIONS TO RESEARCH AND PRACTICE

According to Thomas Insel (2004), director of the National Institute of Mental Health, social workers are doing the majority of frontline work treating individuals with mental illnesses. Citing a 1998 SAMSA report, the current psychotherapy workforce is dominated by social work consisting of 192,814 social workers, 73,014 psychologists, 33,486 psychiatrists, and 17,318 psychiatric nurses (Insel, 2004). Given this information, it seems necessary that social workers be informed regarding intervention evidence in the treatment of mental illnesses such as depression during pregnancy and postpartum, specifically in a population where medication may not be an option for treatment. Therefore, the findings of this review are specifically relevant to social workers.

With respect to the primary aim of this review, the results of the first analysis provide an overview of the effects of current treatments for nonpsychotic major depression during pregnancy and the postpartum included in this review. With the exception of CBT, there is a marked split between the individual treatment interventions when arranged hierarchically by effect size. Interventions using medication, medication in combination with CBT, IPT, and group therapy with cognitive behavioral, educational, and transactional analysis components had the largest effect sizes (> .95), whereas interventions using counseling, educational, and psychodynamic approaches had smaller effect sizes (< .75) or no effect. It is important to note that in this analysis, several of the evaluated treatment types (medication in combination with CBT, group therapy, and psychodynamic therapy) were represented by only one treatment intervention trial. The remaining interventions in this analysis were represented by two, three, or four trials. As research evolves in the treatment of major depression during pregnancy and the postpartum, additional, updated meta-analyses will be needed. Additionally, extraneous variables may be contributing to the effect sizes detected in the analyses.

Regarding the second aim of this review, when we grouped the treatment interventions by type of treatment to determine their relative effectiveness, the results are similar to those reported above. Medication in combination with CBT has the largest effect size (3.871, $p < .001$) followed by medication alone (3.048, $p < .001$); group therapy with cognitive behavioral, educational, and transactional analysis components (2.046, $p < .001$); and IPT (1.260, $p < .001$). The combined effect size of CBT, .642 ($p < .001$), is followed by psychodynamic therapy (.526, $p = .014$), counseling (.418, $p = .014$), and educational interventions (.100, $p = .457$).

With respect to those treatments with the largest effect sizes (medication and CBT, medication alone, group therapy with cognitive behavioral, educational and transactional analysis components, and IPT), findings are similar to those of the National Institute of Mental Health Treatment of Depression Collaborative Research Program (NIMHTDCRP; Elkin et al., 1989) suggesting that the treatment of major depression in women during pregnancy and the postpartum and the treatment of depression at other times in the life cycle may be similar. There are two exceptions, however. The first is the large effect size (2.046, $p < .001$) found for the treatment intervention using group therapy with cognitive behavioral, educational, and transactional analysis components. Although the NIMHTDCRP did not examine the use of group treatment for depression, studies support the use of group therapy, especially in postnatal populations, because of its ability to address both psychosocial problems and cognitive behavioral deficits (Meager & Miligram, 1996). In light of the results of the NIMHTDCRP suggesting the efficacy of medication, medication and psychotherapy (CBT or IPT), and CBT and IPT alone for the treatment of major depression, the fact that CBT had varied effect sizes in this analysis is surprising. Although this could suggest that CBT may not be as effective in the treatment of major depression during pregnancy and the postpartum, there is an alternate explanation. Because of the limited scope of this analysis, the reviewers were only able to examine one of the targeted outcomes for each included study. The reviewers chose to use the EPDS, if available, because this scale was designed to assess depressive symptomatology during pregnancy and the postpartum

period (Cox et al., 1987). CBT is focused strongly on the cognitive symptoms of depression (Beck et al., 1979). If the measurement of the targeted outcome had been a scale more sensitive to the cognitive symptoms of depression, such as the Beck Depression Inventory (Beck, Steer, & Garbin, 1988), the analysis might have yielded different results.

The third and final aim of this review was to evaluate the effect sizes of interventions based on the timing of implementation. Whereas those interventions implemented postpartum had a slightly larger effect size (.837, $p < .001$) than those implemented during pregnancy (.377, $p = .002$), this may be due to an alternative explanation. Medication interventions were implemented only during postpartum. When interventions using medication are omitted from analysis, the effect size of interventions implemented postpartum decreases (from .837 to .703, $p < .001$). This indicates that although part of the difference in timing effect size can be attributed to medication interventions (with large effect sizes) being used in the postpartum period and not during pregnancy, differences cannot be explained in their entirety. Further investigation is needed to examine these differences.

The scope of this review is limited by the fact that we did not assess all of the reliable and valid measures of depressive symptomatology that most of the reported treatment intervention studies used. Future research should conduct further meta-analyses using other available measures of depression.

The mixing of randomized and nonrandomized studies may be a limitation, but this is necessitated by the fact that currently, there are a limited number of adequate studies on depression during pregnancy and postpartum that can be selected. As the field develops, future meta-analyses on randomized and nonrandomized studies should be run separately. This review also includes treatment trials with small numbers of participants and meta-analyses are less robust with small trials. Thus, the results should be interpreted with caution. In addition, the overall quality of trials was variable. Publication bias is suggested by the paucity of negative or no effect trials found for this analysis. However, it is possible that the small number of negative or no effect trials denotes the effectiveness of treatment interventions reported in the literature to date. Additional trials and larger numbers of participants in a future meta-analysis would be required to address these issues. Furthermore, the review was only able to rank the methodological quality of studies using a simple method. Additionally, reported results were limited to the main outcome, depressive symptomatology. Future studies should examine other important variables of interest such as occupational and social functioning, social support, and cost-effectiveness of interventions.

Nonpsychotic major depression during pregnancy and the postpartum are a widespread health threat to mother, infants, and families. This review has described the effects of treatments for depression during pregnancy and has begun to identify those treatments that are most effective in this population. Although further research and analyses are needed to validate the results of this review, preliminary findings suggest that medication, alone or in combination with CBT; group therapy with cognitive behavioral, educational, and transactional analysis components; interpersonal therapy; and CBT produce the largest effect sizes in this population. However, doctors may be reluctant to prescribe medication during pregnancy and the postpartum (for mothers who choose to breastfeed) because absolute safety cannot be assured, although some selective serotonin reuptake inhibitors and other antidepressant medications have demonstrated relative safety during this period (Wisner, Gelenberg, Leonard, Zarin, & Frank, 1999). Additionally, many women may be unwilling to take medication during pregnancy and the postpartum (Oren et al., 2002). This situation creates an urgent need to develop other effective, nonpharmacological treatment alternatives to antidepressant medication. This review has begun the process of identifying these alternative treatments with findings supporting group therapy with cognitive behavioral, educational, and transactional analysis components; IPT; and CBT, respectively.

Although this review has attempted to evaluate the effects of current treatment interventions for nonpsychotic major depression during pregnancy and the postpartum, additional research is needed to validate the findings in this report. In light of the fact that medication—alone and in combination with CBT—was found to have the largest effect size, research should continue to address the safety of pharmacological treatment for major depression during pregnancy and the postpartum. Additional research is also needed to develop and improve existing nonpharmacological treatment of perinatal depression as many women prefer alternatives to medication for the treatment of major depression while pregnant and breastfeeding. Culturally relevant treatments should also be explored in research on depression during pregnancy and the postpartum as low-income and ethnic minority women have higher rates of depression during this point in the life cycle (Hobfoll et al., 1995).

Appendix A
Characteristics of Included Studies

Study	*Study Design*	*Participants*	*Interventions*	*Outcomes*	*Site*	*Timing*	*Study Quality*
Appleby et al. (1997)	Randomized, controlled treatment trial	87 women satisfying criteria for depressive illness 6 to 8 weeks postpartum completed the study; 30% attrition rate	Fluoxetine plus one counseling session (Medication), Placebo plus one counseling session (Control), Fleuoxetine plus six sessions of CBT therapy (Medication + CBT), six sessions of CBT	Revised Clinical Interview Schedule, EPDS, and the Hamilton Rating Scale for Depression at 1, 4, and 12 weeks posttreatment	South Manchester	Postpartum	High
Chabrol et al. (2002)	Randomized, controlled treatment trial	48 women meeting criteria for major depression at 4 to 6 weeks postpartum; 0% attrition rate	CBT for 5 to 8 weeks provided in the participant's home	EPDS, Hamilton Rating Scale for Depression, and Beck Depression Inventory posttreatment at 10 to 12 weeks postpartum	Toulouse and Narbonne, France	Postpartum	High
Cooper et al. (2003)	Randomized, controlled treatment trial	193 women meeting criteria for postpartum depression in the early postpartum period completed the study; 17% attrition rate	Routine primary care (Control), nondirective counseling (Counseling), CBT, or psychodynamic therapy (Psychodynamic); counseling, CBT, and Psychodynamic interventions delivered weekly from 8 to 18 weeks postpartum in the participant's home	EPDS, Structured Clinical Interview for *DSM-III-R* immediately posttreatment at 4.5 postpartum and at 9, 18, and 60 months postpartum	Cambridge	Postpartum	High
Grote et al. (2004)	Open trial treatment study using pretest and posttest design	9 women meeting criteria of major and minor depression during pregnancy completed the study; 78% of women were African American or Latina, 22% were Caucasian; all women were financially disadvantaged	Brief Interpersonal Psychotherapy for Depression—8 weekly sessions of acute treatment during pregnancy, monthly maintenance sessions posttreatment up to 6 months postpartum delivered in clinic or by telephone	Diagnostic Interview Schedule, EPDS, Beck Depression Inventory, Hamilton Rating Scale for Depression, Beck Anxiety Inventory immediately following 8 session intervention and at 2 and 6 months postpartum	Pittsburgh, Pennsylvania	Pregnancy	Medium
Hayes et al. (2001)	Randomized, controlled treatment trial	188 primaparous women meeting criteria for major depression during pregnancy completed the study; 8.7% attrition rate; 94% were Caucasian	Educational intervention (Education) from Week 28 to 36 of pregnancy; Delivered at antenatal clinic or in the participant's home	Profile of Mood States at 8 to 12 and 16 to 24 weeks postpartum	Townsville, Melborne and Adelaide, Australia	Pregnancy	High
Holden et al. (1989)	Randomized, controlled treatment trial	50 women identified as depressed by screening at 6 weeks postpartum and by psychiatric interview at 13 weeks postpartum completed the study; 9 % attrition rate	Counseling for postnatal depression (Counseling) for 8 weeks in the participant's home	Goldberg's Standardized Psychiatric Interview and EPDS posttreatment	Edinburgh and Livingston	Postpartum	Medium

Lane et al. (2001)	Open treatment trial using a pretest and posttest design	18 rural women diagnosed with postpartum depression at 13 weeks postpartum completed the study; 22% attrition rate	Group therapy with cognitive behavioral, educational, and transactional analysis components for postnatal depression (Group) for 10 weeks	EPDS posttreatment	New South Wales, Austrailia	Postpartum	Medium
O'Hara et al. (2000)	Randomized, controlled treatment trial	99 postpartum women meeting *DSM-IV* criteria for major depression completed the study; 18% attrition rate	IPT for 12 weekly sessions	Hamilton Rating Scale for Depression, Structured Clinical Interview for *DSM-IV* Axis 1 Disorders, and Beck Depression Inventory at 4, 8, and 12 weeks in treatment	Polk, Johnson, Linn, and Scott County, Iowa	Postpartum	High
Spinelli (1997)	Open treatment trial using a pretest and posttest design	9 pregnant women who met *DSM-III-R* criteria for major depression; 31% attrition rate; 54% of participants were Latina, 15% were Black, and 31% were Caucasian	16 weeks of IPT for antepartum depression	Structured Clinical Interview for *DSM-IV* Axis 1 Disorders, Clinical Global Impression, Hamilton Rating Scale for Depression, Beck Depression Inventory, and EPDS posttreatment	New York City	Pregnancy	Medium
Spinelli et al. (2003)	Randomized, controlled, bilingual treatment trial	38 pregnant women who met *DSM-IV* criteria for major depression; 24% attrition rate; 66% were Latina, 29% were Caucasian, and 5% were African American; 53% had total annual household incomes under $25,000	IPT for antenatal depression, didactic parenting education (Education); 16 weekly sessions	Structured Clinical Interview for *DSM-IV* Axis 1 Disorders, Clinical Global Impression, Hamilton Rating Scale for Depression, Beck Depression Inventory, and EPDS posttreatment		Pregnancy	High
Suri et al., 2001	Open treatment trial	6 women diagnosed with major depression within 8 weeks postpartum completed the study; 17% attrition rate	Treatment with Fluvoxamine (50mg to start, titrated to 150mg by Week 2) for 8 weeks (Medication)	Hamilton Rating Scale for Depression and the EPDS weekly	Los Angeles, California	Postpartum	Low

CBT = cognitive behavioral therapy; *DSM-III-R* = *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edition, revised; *DSM-IV* = *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition; IPT = interpersonal psychotherapy; EPDS = Edinburgh Postnatal Depression Scale.

Appendix B
Characteristics of Excluded Studies

Study	*Reason for Exclusion*
Bosquet and Egeland (2001)	Study did not focus on depression as a main outcome
Lewis-Hall, Wilson, Tepner, and Koke (1997)	Study was not specifically focused on women during pregnancy and the postpartum; data on this subgroup could not be separated from the study sample
Morrell, Spiby, Stewart, Walters, and Morgan (2000)	Study did not focus on depression as a main outcome
Nahas et al. (1999)	$N = 1$
Parry et al. (2000)	Intervention not comparable to interventions included in the analysis
Reid, Glazener, Murray, and Taylor (2002)	This was a prevention study, not a treatment study
Wisner et al. (2001)	This was a prevention study, not a treatment study
Zlotnick, Johnson, Miller, Pearlstein, and Howard (2001)	This was a prevention study, not a treatment study

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