POSTPARTUM DEPRESSION: LITERATURE REVIEW OF RISK FACTORS AND INTERVENTIONS

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Prepared for:
Toronto Public Health
October 2003

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TORONTO Public Health

Ontario Early Years

Financial assistance by Health Canada

Citation:

The following citation should be used when referring to the entire document. Specific chapter citations are noted at the beginning of each chapter.

Stewart, D.E., Robertson, E., Dennis, C-L., Grace, S.L., & Wallington, T. (2003). Postpartum depression: Literature review of risk factors and interventions.

POSTPARTUM DEPRESSION: LITERATURE REVIEW OF RISK FACTORS AND INTERVENTIONS

Table of Contents

EXECUTIVE SUMMARY

This Postpartum Depression Literature Review of Risk Factors and Interventions, commissioned by Toronto Public Health, is a comprehensive review of the literature from 1990-2002 in four related areas: 1) risk factors for postpartum depression, 2) its detection, prevention and treatment 3) the effects of the illness on the mother- infant relationship and child growth and development and 4) public health interventions and strategies which reduce or mitigate the impact of postpartum depression on the mother-infant relationship and the growth and development of children. This report critically evaluates the literature, lists gaps and formulates conclusions based on the best available current evidence.

OVERALL MESSAGES

Depression is a major public health problem that is twice as common in women as men during the childbearing years. Postpartum depression is defined within this report as an episode of non-psychotic depression according to standardized diagnostic criteria with onset within 1 year of childbirth.

1. RISK FACTORS FOR POSTPARTUM DEPRESSION

Research studies have consistently shown that the following risk factors are strong predictors of postpartum depression: depression or anxiety during pregnancy, stressful recent life events, poor social support and a previous history of depression. Moderate predictors of postpartum depression are childcare stress, low self-esteem, maternal neuroticism and difficult infant temperament. Small predictors include obstetric and pregnancy complications, negative cognitive attributions, single marital status, poor relationship with partner, and lower socioeconomic status including income. No relationship was found for ethnicity, maternal age, level of education, parity, or gender of child (in Western societies).

2. DETECTION, PREVENTION AND TREATMENT

While postpartum depression is a major health issue for many women from diverse cultures, this condition often remains undiagnosed. Although several measures have been created to detect depressive symptomatology in women who have recently given birth, the development of a postpartum depression screening program requires careful consideration. Evidence-based decisions need to be made regarding: (1) the most effective screening test that not only has good sensitivity and specificity, but is quick, easy to interpret, readily incorporated into practice, and culturally sensitive; and (2) health care system issues such as cost-effectiveness, potential harm, and policies for referral. Auspiciously, preliminary research suggests postpartum depression is amenable to treatment interventions thus providing a rationale for the development of a screening program. However, few well-designed randomized controlled trials have been conducted to effectively guide practice and policy recommendations and further research is required before evidence-based programs are widely implemented. One certainty is that there is no single aetiological pathway by which women develop postpartum depression, thus it is improbable that a single preventive/treatment modality will be effective for all women.

3. THE EFFECTS OF THE ILLNESS ON THE MOTHER-INFANT RELATIONSHIP AND CHILD GROWTH AND DEVELOPMENT

Current research suggests that postpartum depression has salient but selective effects on the mother-infant relationship, and child growth and development. Young children of mothers with postpartum depression have greater cognitive, behavioural, and interpersonal problems than children of non-depressed mothers. With regard to emotional growth and development, studies support an early effect of postpartum depression on infant affect, but do not support longer effects. Overall, it is exposure to prolonged episodes of postpartum depression or to recurrent episodes of maternal depression that are most likely to have long term effects on the child.

4. PUBLIC HEALTH INTERVENTIONS AND STRATEGIES WHICH REDUCE OR MITIGATE THE IMPACT OF POSTPARTUM DEPRESSION ON THE MOTHER-INFANT RELATIONSHIP AND THE GROWTH AND DEVELOPMENT OF CHILDREN

The potential adverse effect of postpartum depression upon the maternal-infant relationship and child development reinforces the need for early identification and effective treatment models. Unfortunately, there are few studies of public health interventions that can prevent or mitigate the impact of postpartum depression on these outcomes. A few studies, of variable quality, have explored the impact of interventions such as home visiting, telephone counseling, interactive coaching, group interventions, and massage therapy. The results of these studies are still very preliminary and must be interpreted with caution. Large, well-controlled longitudinal studies that specifically measure maternal-infant relations and child development are required.

METHODOLOGY FOR REVIEW

A critical literature review of English language peer-reviewed publications from 1990-2002 was undertaken by an academic research team at University Health Network Women's Health Program (see pp. 5-8 and Appendix D). A list of search terms, databases, key journals that were hand searched and search strategy is found in Appendices A to D. All relevant articles were critically appraised and their quality graded on levels of evidence and strength of recommendation based on standardized methodology developed by the Canadian Task Force on Preventive Health Care (see pp.7-8).

CAVEATS

Findings in this report are based on studies of variable size and quality which sometimes reach differing conclusions. Most were conducted outside of Canada and need to be interpreted and applied within a Canadian context. Only the studies published since 1990 and in English or with an English abstract were included. A rigorous effort was made through expert opinion and personal contacts to include early seminal studies.

The literature varied in terms of the quality of the sampling procedures employed. Issues of bias selection, lack of randomized frameworks and studies being under-powered to detect effects were common limitations. This may be a reflection of the difficulty in recruiting and retaining large samples for intervention studies, or the difficulty of obtaining longitudinal data on mother-child relationships and child development. The results and recommendations made in this report must be evaluated in the light of a dearth of evidence-based literature.

CONCLUSIONS

Postpartum depression (PPD) is a significant public health problem which affects approximately 13% of women within a year of childbirth. Although rates of depression do not appear to be higher in women in the period after childbirth compared to age matched control women (10-15%), the rates of first onset and severe depression are elevated by at least three-fold. Depression at this critical period of life carries special meanings and risks to the woman and her family. It is possible to identify women with increased risk factors for PPD, but the unacceptably low positive predictive values of all currently available antenatal screening tools make it difficult to recommend them for routine care. Several postpartum screening tools exist but the optimal time for screening and their applicability to multicultural populations are not yet established. Meta-analysis of depression screening programs generally conclude that depression screening must be combined with systemic paths for referral of cases and well defined and implemented care plans to achieve outcome benefits. Unfortunately PPD remains underdiagnosed and undertreated. Research suggests that PPD is amenable to the same treatment interventions as general depression but few randomized controlled trials exist to guide practice and policy for this population.

Evidence exists for short term negative effects of maternal PPD on the emotional, behavioural, cognitive, and interpersonal development of young children, but these appear to be time limited. However, prolonged or recurrent periods of maternal depression appear to be more likely to cause longer term effects on children. Public health interventions to reduce or mitigate the impact of PPD on the mother-infant relationship or growth and development of children are nascent and current evidence makes it difficult to recommend them as standard practice.

NEXT STEPS

This report highlighted a number of gaps in the literature that need to be addressed in future research to develop optimal evidence based policy decisions and service provision. This includes research regarding the best way to prevent, detect and treat postpartum depression and research which examines the sequelae of postpartum depression for the mother and child within diverse ethnic and socioeconomic groups. Large, well-controlled longitudinal studies that specifically measure the effects of promising interventions on the woman, maternal-infant relations and child development are urgently needed.

Next steps in policy and practice include the need for greater awareness among the public and healthcare professionals of postpartum depression and the local resources available for the optimal treatment of women suffering from it. Programs related to prevention, early detection, optimal treatments, and amelioration of the effects of postpartum depression on the mother-infant relationship and child growth and development should be based on sound evidence as it emerges.

OVERALL METHODOLOGICAL FRAMEWORK

PLAN

This critical literature appraisal from 1990 to 2002 was undertaken by academic researchers at University Health Network Women's Health Program. The multidisciplinary team from a variety of backgrounds, including women's health, psychiatry, psychology, sociology, public health and nursing, met during the project to compare findings and ensure consistency was maintained throughout the report. This section will describe the methods used by the authors to appraise and synthesize literature pertaining to postpartum depression and its effects on the mother and child.

The review has four related chapters:

CHAPTER	TITLE
1	**Risk Factors for Postpartum Depression**
2	**The Detection, Prevention and Treatment of Postpartum Depression**
3	**The Effect of Postpartum Depression on the Mother-Infant Relationship and Child Growth and Development**
4	**Public Health Interventions and Strategies which Reduce or Mitigate the Impact of Postpartum Depression on the Mother-Infant Relationship and the Growth and Development of Children**

Overall Inclusion Criteria

- English Language
- 1990 onwards – unless it is a classic or significant piece of work as identified by expert opinion
- Peer reviewed
- Grey literature to identify ongoing or promising programs

Overall Exclusion Criteria

- Maternal depression with an onset greater than 1 year postpartum
- Article not readily available without significant expense and deemed unhelpful (i.e. unpublished dissertation with an abstract that did not add new information and cost over $100USD each)

- Article not written in English and without an English abstract

Search Terms & Databases Used to Identify Literature

In consultation with Marina Englesakis (MLIS) an Information Specialist in Libraries & Information Services at the University Health Network, the research team identified search terms and strategies which would retrieve articles pertinent to the focus of each chapter (See Appendix A).

The research team searched on-line databases which contain and reflect the medical, nursing, allied health, psychological and social science literature (See Appendix B for a complete list of databases used). They also reviewed references in retrieved articles for any additional papers that met our criteria.

Review of Tables of Contents in Key Journals

Although a thorough literature search of databases should have identified all relevant papers, for completeness we hand-searched the table of contents for 42 key journals for the last two years, to ensure that suitable papers had not been omitted. All relevant papers within these journals were forwarded to the appropriate chapter author. A list of these key journals is given in Appendix C.

Grey Literature

In order to identify work in addition to that published in academic journals (including dissertations and theses) the research team conducted a search of the 'grey literature'. This included searching for work undertaken and published as reports by governments and charities as well as on-going projects and initiatives. Publications and information from relevant psychiatric, psychological, nursing and medical organizations were also examined. Where relevant, key international researchers were contacted to obtain further information on studies in progress. Information and new contacts were also established through attendance at key meetings, including the Marcé Society Meeting (an international society devoted to the study of postpartum depression).

Critical Evaluation & Appraisal of the Literature

The fundamental principles of critical appraisal were applied to each research study, paper or article by the individual reviewers. A summary of these principles is given below.

An assessment of the quality, relevance and contribution of the study to existing literature
The scientific rigour and appropriateness of study design
Evaluation of bias throughout the research process
Evaluation of statistical methods including data collection, use of statistical tests and reporting of data
Appropriateness of conclusions and recommendations drawn from the study

The differing aims of each chapter necessitated that different aspects of the research would be more pertinent for specific topics. The relevant critical appraisal issues are discussed within each individual chapter.

For Chapters 1 and 3, the most pertinent research issues related to study design, sampling frameworks and the use of standardized measures. Hence, the critical appraisal focused on these areas.

For Chapters 2 and 4 a different methodological framework was used to evaluate the interventions. The approach used was based on the standardized methodology for evaluating the effectiveness of interventions developed by the Canadian Task Force on Preventive Health Care (CTFPHC) (See Table I).

Table I. Quality of Evidence Guidelines from the Canadian Task Force on Preventive Health Care

CLASSIFICATION	RESEARCH DESIGN RATING
I	Evidence from randomized controlled trial(s)
II-1	Evidence from controlled trial(s) without randomization.
II-2	Evidence from cohort or case-control analytic studies, preferably from more than one centre or research group.
II-3	Evidence from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940's) could also be included in this category.
III	Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.

The basic premise of CTFPHC methodology, which has been created and refined in collaboration with the US Preventive Services Task Force, is that recommendations of graded strength are formed on the intervention being evaluated, based on the quality of the published evidence. The greatest weight is placed on the features of the study design and analysis that tend to eliminate or minimize biased results. The strongest evidence comes from well-designed studies with appropriate follow-up that demonstrate that individuals who received the intervention experienced a significantly better overall outcome than those who did not receive the intervention.

Therefore, the hierarchy of evidence places emphasis on study designs that are less vulnerable to bias and errors of inference such as the randomized controlled trial. Having said that, it is important to emphasize that the value of a study is not solely based on the design category to which it can be assigned. A poorly designed randomized controlled trial (RCT) may offer less value to the scientific literature than a very well designed cohort study which is more vulnerable to bias by virtue of inherent qualities in the design. As a result, all studies must be individually appraised for design strengths and weaknesses.

Accordingly, a quality or internal validity rating may also be assigned. "Good" studies (including meta-analyses or systemic reviews) meet all design-specific criteria well. "Fair" studies do not meet (or it is unclear that they meet) at least one design-specific criterion, but have no "fatal flaw". "Poor" studies have at least one design-specific "fatal flaw" or an accumulation of lesser flaws to the extent that the results of the study are not deemed able to inform recommendations.

Once the strengths and weaknesses of each individual study for each type of intervention were determined, results were synthesized to form a comprehensive body of evidence for that given category of intervention. Finally, each intervention was given a grade based on the grading system developed by the CTFPHC task force (See Table II).

Table II. Classification of Recommendations from the Canadian Task Force on Preventive Health Care

CLASSIFICATION	DESCRIPTION OF EVIDENCE
A	There is good evidence to support the recommendation that the intervention be specifically considered.
B	There is fair evidence to support the recommendation that the intervention be specifically considered.
C	There is conflicting evidence regarding the inclusion or exclusion of the intervention but recommendations may be made on other grounds.
D	There is fair evidence to support the recommendation that the intervention be excluded from consideration.
E	There is good evidence to support the recommendation that the intervention be excluded from consideration.
I	There is insufficient evidence (in quantity and/or quality) to make a recommendation, however other factors may influence decision-making.

Clearly, the strongest recommendations A and E are reserved for interventions whose value is supported or negated by high quality evidence such as type I RCT evidence. In general, type II evidence is associated with B and D recommendations. However, it is important to emphasize that other factors were also considered in the final ranking of the evidence. As duly noted by the task force in their guidelines, there are often many other factors that go beyond the validity of a study's design that can affect the grade of a recommendation. This will be discussed further in the methods sections of Chapters 2 and 4.

Finally, when there is conflicting evidence, a more conservative recommendation is offered, and this is represented by a C recommendation. This grade means that there is contradictory evidence regarding the intervention and that decision-making must be guided by factors other than the published scientific evidence (CTFPHC). When such a grade is given, it is up to the individual clinician or organization to decide whether or not to implement the intervention, based on both the quality of the evidence and the feasibility and need for the intervention in the defined target population. When there is insufficient evidence in quantity or quality to make a recommendation, an I grade is assigned to the intervention, however other factors may influence decision-making.

CHAPTER 1: RISK FACTORS FOR POSTPARTUM DEPRESSION

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Citation:

This chapter should be cited as:
Robertson, E., Celasun, N., and Stewart, D.E. (2003). Risk factors for postpartum depression. In Stewart, D.E., Robertson, E., Dennis, C.-L., Grace, S.L., & Wallington, T. (2003). Postpartum depression: Literature review of risk factors and interventions.

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Financial assistance by Health Canada

CHAPTER 1: RISK FACTORS FOR POSTPARTUM DEPRESSION

Table of Contents

CHAPTER SUMMARY

Introduction / Background

Postpartum non-psychotic depression is the most common complication of childbearing affecting approximately 10-15% of women and as such represents a considerable public health problem affecting women and their families. This chapter will provide a synthesis of the recent literature pertaining to risk factors associated with developing this condition.

Methods

Databases relating to the medical, psychological and social science literature were searched using specific inclusion criteria and search terms, to identify studies examining risk factors for postpartum depression. Studies were identified and critically appraised in order to synthesize the current findings. The search resulted in the identification of two major meta-analyses conducted on over 14,000 subjects, as well as newer subsequent large-scale clinical studies. The results of these studies were then summarized in terms of effect sizes as defined by Cohen.

Key Findings

The findings from the meta-analyses of over 14,000 subjects, and subsequent studies of nearly 10,000 additional subjects found that the following factors were the strongest predictors of postpartum depression: depression during pregnancy, anxiety during pregnancy, experiencing stressful life events during pregnancy or the early puerperium, low levels of social support and having a previous history of depression. Moderate predictors were high levels of childcare stress, low self esteem, neuroticism and infant temperament. Small predictors were obstetric and pregnancy complications, negative cognitive attributions, quality of relationship with partner, and socioeconomic status. Ethnicity, maternal age, level of education, parity and gender of child (in Western societies) were not predictors of postpartum depression.

Critical appraisal of the literature revealed a number of methodological and knowledge gaps that need to be addressed in future research. These include examining specific risk factors in women of lower socioeconomic status, risk factors pertaining to teenage mothers, and the use of appropriate instruments for assessing postpartum depression in different cultural groups.

LIST OF TABLES

LIST OF FIGURES

Introduction

The postnatal period is well established as an increased time of risk for the development of serious mood disorders. There are three common forms of postpartum affective illness: the blues (baby blues, maternity blues), postpartum (or postnatal) depression and puerperal (postpartum or postnatal) psychosis each of which differs in its prevalence, clinical presentation, and management.

Postpartum non-psychotic depression is the most common complication of childbearing affecting approximately 10-15% of women and as such represents a considerable public health problem affecting women and their families (Warner et al., 1996). The effects of postnatal depression on the mother, her marital relationship, and her children make it an important condition to diagnose, treat and prevent (Robinson & Stewart, 2001).

Untreated postpartum depression can have adverse long-term effects. For the mother, the episode can be the precursor of chronic recurrent depression. For her children, a mother's ongoing depression can contribute to emotional, behavioral, cognitive and interpersonal problems in later life (Jacobsen, 1999).

If postpartum depression is to be prevented by clinical or public health intervention, its risk factors need to be reliably identified, however, numerous studies have produced inconsistent results (Appleby et al.,1994; Cooper et al., 1988; Hannah et al.,1992; Warner et al., 1996). This chapter will provide a synthesis of the recent literature pertaining to risk factors associated with developing this condition.

Postpartum Affective Illness

Postpartum Period & Increased Risk of Severe Psychiatric Illness

The association between the postpartum period and mood disturbances has been noted since the time of Hippocrates (Miller, 2002). Women are at increased risk of developing *severe psychiatric illness* during the puerperium. Studies have shown that a woman has a greatly increased risk of being admitted to a psychiatric hospital within the first month postpartum than at any other time in her life (Kendell et al.,1987; Paffenbarger, 1982). Up to 12.5% of all psychiatric hospital admissions of women occur during the postpartum period (Duffy, 1983).

However recent evidence from epidemiological and clinical studies suggests that mood disturbances following childbirth are not significantly different from affective illnesses that occur in women at other times. Population based studies in the USA and the United Kingdom, for instance, have revealed similar rates of less severe depressive illness in puerperal and nonpuerperal cohorts (Cox et al.,1993; Kumar & Robson, 1984; O'Hara et al.,1991a). Also, the clinical presentation of depression occurring in the puerperium is similar to major depression occurring at other times, with symptoms of depressed mood, anhedonia and low energy and suicidal ideation commonplace.

Clinical Classification of Postpartum Illnesses

There has long been controversy as to whether puerperal illnesses are separate, distinct illnesses (Hamilton, 1982; Hays & Douglass, 1984; Hays, 1978) or episodes of a known psychiatric disorder such as affective disorders or schizophrenic psychoses, which occur coincidentally in the puerperium or are precipitated by it (Platz & Kendell, 1988; Robling et al., 2000).

Brockington (1988) argues that childbirth should be seen as a general stressor, like any other 'life event' which can trigger an attack of illness across the whole spectrum of psychiatric disorders. This view is now generally accepted and is supported by the wide variety of clinical disorders which follow childbirth, and the variety of symptoms which are found in illnesses which start after delivery.

Postpartum Affective Disorders

Postpartum affective disorders are typically divided into three categories: postpartum blues, nonpsychotic postpartum depression and puerperal psychosis.

The prevalence, onset and duration of the three types of postpartum affective disorders are shown in Table 1-1 (Adapted from Nonacs & Cohen, 1998). Each of them shall be discussed briefly.

Table 1-1. Postpartum Affective Disorders: Summary of Onset, Duration & Treatment

Disorder	Prevalence	Onset	Duration	Treatment
Blues	30 – 75%	Day 3 or 4	Hours to days	No treatment required other than reassurance
Postpartum Depression	10 – 15%	Within 12 months	Weeks – months	Treatment usually required
Puerperal Psychosis	0.1 – 0.2 %	Within 2 weeks	Weeks - months	Hospitalization usually required

Postpartum Blues

Postpartum blues is the most common observed puerperal mood disturbance, with estimates of prevalence ranging from 30-75% (O'Hara et al., 1984). The symptoms begin within a few days of delivery, usually on day 3 or 4, and persist for hours up to several days. The symptoms include mood lability, irritability, tearfulness, generalized anxiety, and sleep and appetite disturbance. Postnatal blues are by definition time-limited and mild and do not require treatment other than reassurance, the symptoms remit within days (Kennerly & Gath, 1989; Pitt, 1973).

The propensity to develop blues is unrelated to psychiatric history, environmental stressors, cultural context, breastfeeding, or parity (Hapgood et al.,1988), however, those factors may influence whether the blues lead to major depression (Miller, 2002). Up to 20% of women with blues will go on to develop major depression in the first year postpartum (Campbell et al., 1992; O'Hara et al., 1991b).

Postpartum Depression

As the focus of this chapter is postpartum depression, only a brief overview shall be provided here. Data from a huge population based study showed that nonpsychotic postpartum depression is the most common complication of childbearing, occurring in 10-15% of women after delivery (O'Hara & Swain, 1996). It usually begins within the first six weeks postpartum and most cases require treatment by a health professional.

The signs and symptoms of postpartum depression are generally the same as those associated with major depression occurring at other times, including depressed mood, anhedonia and low energy. Reports of suicidal ideation are also common.

Screening for postnatal mood disturbance can be difficult given the number of somatic symptoms typically associated with having a new baby that are also symptoms of major depression, for example, sleep and appetite disturbance, diminished libido, and low energy (Nonacs & Cohen, 1998). Whilst very severe postnatal depressions are easily detected, less severe presentations of depressive illness can be easily dismissed as normal or natural consequences of childbirth.

Puerperal or Postpartum Psychosis

Very severe depressive episodes which are characterized by the presence of psychotic features are classed as postpartum psychotic affective illness or puerperal psychosis. These are different from postpartum depression in aetiology, severity, symptoms, treatment and outcome.

Postpartum psychosis is the most severe and uncommon form of postnatal affective illness, with rates of 1 – 2 episodes per 1000 deliveries (Kendell et al., 1987). The clinical onset is rapid, with symptoms presenting as early as the first 48 to 72 hours postpartum, and the majority of episodes developing within the first 2 weeks after delivery. The presenting symptoms are typically depressed or elated mood (which can fluctuate rapidly), disorganized behaviour, mood lability, and delusions and hallucinations (Brockington et al., 1981). Follow-up studies have shown that the majority of women with puerperal psychosis meet criteria for bipolar disorder (Brockington et al., 1981; Dean & Kendell, 1981; Kendell et al., 1987; Klompenhouwer & van Hulst, 1991; Kumar et al., 1995; Meltzer & Kumar, 1985; Okano et al., 1998; Robling et al., 2000; Schopf et al., 1984).

Research evidence has shown that risk factors for puerperal psychosis are biological and genetic in nature (see Jones et al., 2001). Psychosocial and demographic factors are probably not major factors in the development of puerperal psychosis (Brockington et al., 1990; Dowlatshahi & Paykel, 1990).

Compelling evidence from recent studies of puerperal psychosis suggest that the major risk factor for developing the illness is genetic. Jones & Craddock (2001) found that the rate of puerperal psychosis after deliveries in women with bipolar disorder was 260 / 1000 deliveries, and the rates of puerperal psychosis for

women with bipolar disorder who also had a family history of puerperal psychosis was 570 / 1000 deliveries. This compares to a risk in the general population of 1-2 / 1000 deliveries.

Due to the nature of psychotic or depressive symptoms, new mothers are at risk of injuring their children through neglect, practical incompetence or command hallucinations or delusions (Attia et al.,1999). Infanticide is rare, occurring in 1-3 / 50,000 births (Brockington & Cox-Roper, 1988; Jason et al.,1983), however, mothers with postpartum psychotic disorders commit a significant percentage of these, and estimates suggest that 62% of mothers who commit infanticide also go on to commit suicide (Gibson, 1982). Because of these serious consequences, early diagnosis and treatment interventions of postnatal illnesses are imperative for the health and well being of the mother and child (Attia et al., 1999).

Puerperal psychosis requires hospitalization for treatment (Nonacs & Cohen, 1998). Although the prognosis is generally favourable and women fully recover they are at risk of developing further puerperal and nonpuerperal episodes of bipolar affective disorder (Reich & Winokur, 1970; Schopf et al., 1984).

Postpartum Depression: Clinical & Diagnostic Issues

Postpartum depression is the most common complication of childbearing and as such represents a considerable public health problem affecting women and their families (Warner et al., 1996). The effects of postnatal depression on the mother, her marital relationship, and her children make it an important condition to diagnose, treat and prevent (Robinson & Stewart, 2001).

Untreated postpartum depression can have adverse long term effects. For the mother, the episode can be the precursor of chronic or recurrent depression. For her children, a mother's ongoing depression can contribute to emotional, behavioral, cognitive and interpersonal problems in later life (Jacobsen, 1999).

If postpartum depression is to be prevented by clinical or public health intervention, its risk factors need to be reliably identified, however, numerous studies have produced incomplete consensus on these (Warner et al., 1996; Cooper et al., 1988; Hannah et al., 1992). The remainder of this chapter will provide a synthesis of the recent literature pertaining to risk factors associated with developing the illness.

Prevalence

O'Hara & Swain (1996) in a meta analysis of 59 studies from North America, Europe, Australasia and Japan (n=12,810 subjects), found an overall prevalence rate of postpartum depression of 13%. This was based on studies that assessed symptoms after at least two weeks postpartum (to avoid confounding of postpartum blues) and used a validated or standardized measure to assess depression.

<u>Maternal Age</u>

It should be noted that the literature pertains to adult women of 18 years and older. Research which has examined the rates of postpartum depression in mothers aged 14 - 18 years (n=128) showed a much higher

rate of illness, approximately 26% (Troutman & Cutrona, 1990). However, within this younger population there may be risk factors which predispose not only to postpartum depression, but also to pregnancy during adolescence and therefore are not independent risk factors for postpartum depression. This is a population which requires further research to establish specific risk factors.

Clinical Presentation

Postpartum depression usually begins within 1–12 months after delivery. In some women, post partum blues simply continue and become more severe. In others, a period of wellbeing after delivery is followed by a gradual onset of depression. The patterns of symptoms in women with postpartum depression are similar to those in women who have depression unrelated to childbirth (Wisner, Parry, & Piontek, 2002), apart from the fact that the content may focus on the delivery or baby. Evidence from epidemiological and clinical studies suggests that mood disturbances following childbirth are not significantly different from affective illnesses that occur in women at other times (Cox et al., 1993; Kumar et al., 1984; O'Hara et al., 1991a) .

Postpartum depression is characterized by tearfulness, despondency, emotional lability, feelings of guilt, loss of appetite, and sleep disturbances as well as feelings of being inadequate and unable to cope with the infant, poor concentration and memory, fatigue and irritability (Robinson et al., 2001). Some women may worry excessively about the baby's health or feeding habits and see themselves as 'bad', inadequate, or unloving mothers (Robinson et al., 2001).

Diagnosis

There are two main classification systems used within psychiatry: The American Psychiatric Association's Diagnostic & Statistical Manual of Mental Disorders now in its fourth edition (DSM-IV, 1994) and the 10th edition of the International Classification of Diseases, (ICD-10), published by the World Health Organization (World Health Organization, 1993).

The DSM-IV (American Psychiatric Association, 1994) and ICD-10 (World Health Organization, 1993) contain standardized, operationalized diagnostic criteria for known mental disorders, and are used globally to diagnose patients within clinical and research settings. The Research Diagnostic Criteria (RDC), (Spitzer, Endicott, & Robins, 1978) is also commonly used within research studies as a means of classifying psychiatric disorders.

As previously stated, the literature suggests that postpartum mood disturbances do not differ significantly from affective illnesses that occur in women at other times (Cox et al., 1993; Kumar et al., 1984; O'Hara et al., 1991a; O'Hara et al., 1991b).

At present, postpartum depression is not classified as a separate disease in its own right: it is diagnosed as part of affective or mood disorders in both DSM-IV (American Psychiatric Association, 1994) and ICD-10 (World Health Organization, 1993). Within DSM-IV there is a specifier 'with postpartum onset' to

identify affective or brief psychotic episodes that occur during the postpartum period: an episode is specified as having a postpartum onset if it occurs *within the first 4 weeks* after delivery (American Psychiatric Association, 1994). Similarly in ICD-10, the episode must be diagnosed within a main diagnostic category with the specifier to indicate the association with the puerperium (World Health Organization, 1993).

The symptoms required to meet DSM-IV criteria for a major depressive episode are shown in Figure 1-1.

Figure 1-1. DSM-IV Criteria for Major Depressive Disorder

Criteria for Major Depressive Episode

Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.
Note: Do not include symptoms that are clearly due to a general medical condition, or mood-incongruent delusions of hallucinations.

- Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g. feels sad or empty) or observation made by others (e.g. appears tearful)
- Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)
- Significant weight loss when not dieting or weight gain (e.g. a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day
- Insomnia or hypersomnia nearly every day
- Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)
- Fatigue or loss of energy nearly every day
- Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)
- Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)
- Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide
- The symptoms do not meet criteria for a Mixed Episode
- The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning
- The symptoms are not due to the direct physiological effects of a substance (e.g. a drug of abuse, a medication) or a general medical condition (e.g. hypothyroidism)
- The symptoms are not better accounted for by Bereavement, i.e. after the loss of a loved one, the symptoms persist for longer than 2 months or are characterized by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms or psychomotor retardation.
- Postpartum onset specifier: Onset of episode within 4 weeks postpartum

Defining Temporal Criteria

An obvious limitation of the temporal criteria used within DSM-IV is that it excludes all cases which have an onset later than 4 weeks postpartum. This has implications for establishing accurate prevalence rates of the illness, as cases with an onset later than 4 weeks could not easily be identified as being related to childbirth in many studies.

The maximum time interval used to define the puerperal period differs among studies. Some authors e.g. Paffenbarger (1982), Arentsen (1968) defined puerperal illness as any illness leading to hospital admission within 6 months of delivery. Others, like Brockington et al. (1982) have argued that the time interval should be restricted to illnesses starting within 2 or 3 weeks of delivery. Kendell et al. (1987) argued that if the onset criteria is hospital admission or contact, a cut-off point of 90 days is the most appropriate.

Based on the results of epidemiological studies, the time frame most commonly used to specify a postpartum onset within research studies ranges from 3 months (Kendell et al., 1987) to up to 12 months after delivery (Miller, 2002). This is to ensure that all cases of postpartum depression are included within research studies to provide accurate information on the clinical and diagnostic aspects of the illness.

Diagnostic Definitions

The term ‘postpartum depression’ refers to a nonpsychotic depressive episode that begins in the postpartum period (Cox et al., 1993; O'Hara, 1994; Watson et al.,1984).

In past research, these depressions have been defined in a number of ways (O'Hara & Zekoski, 1988) however, more recent and rigorous studies have defined postpartum depression based on standardized diagnostic criteria for depression including DSM-IV (American Psychiatric Association, 1994) ICD-10 (World Health Organization, 1993) and RDC .

As previously stated, screening for postnatal mood disturbance can be difficult given the number of somatic symptoms typically associated with having a new baby that are also symptoms of major depression (Nonacs et al., 1998). Distinguishing between depressive symptoms and the supposed ‘normal’ sequelae of childbirth, such as changes in weight, sleep, and energy is a challenge that further complicates clinical diagnosis (Hostetter & Stowe, 2002).

For example, although it is difficult to assess sleep disturbance in new mothers, the clinician may ask about the mother’s ability to easily rest or sleep when given the opportunity. Many women with postpartum depression often have such high levels of anxiety that they are unable to rest or return to sleep after getting up with the infant at night.

Postpartum alterations in body weight are highly variable and it is important to ask about a woman’s ‘desire for food’ and ‘whether food tastes good’. The issue of libido should be expanded to include the acceptance of affection.

Further confounding the determination of postpartum depression is the presence of possible physical causes (including anemia, diabetes, and thyroid dysfunction) that could potentially contribute to depressive symptoms (Pedersen et al., 1993).

Assessment of Depression: Clinical & Self Report Measures

Historically several types of outcome measures of depression have been used, however, more recent studies use standardized measures, assessed by clinical interview or self-report (O'Hara et al., 1988).

Semistructured clinical interviews based on diagnostic research criteria allow the elicitation of psychopathological symptoms in order to generate diagnoses. The use of standardized interviews increases the reliability of diagnoses between researchers, and allows researchers to establish and assess the severity of symptoms, through probing questions. The financial and time costs associated with performing face-to-face interviews however restrict their use to a limited number of subjects usually within a research study.

Self-report measures are easier and cheaper to administer and do not require the presence of specifically trained clinicians, thereby enabling a larger sample to be studied. While self-report measures have the advantage of objectivity, they are usually designed to provide diagnostic information. The measures have a 'threshold' or 'cut off' score, which usually indicates that the individual meets symptom criteria for being considered a 'case' (of postpartum depression in this example).

However, the practice of using a 'cut off' score on a rating scale such as the Beck Depression Inventory (BDI) or the General Health Questionnaire (GHQ), to identify women with postpartum depression can lead to misclassification. High scores on such measures may reflect factors other than depression, including physical ill health. For example, the BDI has many items that would be expected to give elevated scores even in the course of a normal pregnancy or puerperium e.g. fatigue, body image, sleep disturbance, loss of libido.

In making a diagnosis of depression, the length of time that the symptoms have been present and the extent to which the symptoms interfere with the woman's usual functioning are pertinent. These considerations are rarely addressed in self-report measures.

In order to address some of these issues, rating scales have been developed specifically for use within a postnatal population. The most well established is the Edinburgh Postnatal Depression Rating Scale (EPDS), a 10 item self rated measure that has been translated into more than a dozen languages and is highly correlated with physician rated depression measures (Cox, Holden, & Sagovsky, 1987).

Using the EPDS women who exceed a threshold score of 10 (within family practices) and 12 (within research studies) have a greater likelihood of being depressed (Cox et al., 1987).

Even though women who are classified as depressed on the basis of a self-report measure may not meet criteria for syndromal depression – e.g. using DSM-IV criteria, they often experience significant personal distress and social morbidity (Johnson, Weissman, & Klerman, 1992; Wells et al., 1989).

Outcomes

The majority of postnatal depressions are self limiting, resolving within months of onset (Kumar et al., 1984; Watson et al., 1984). However, for many women childbirth is the stressor which triggers the start of recurrent or chronic episodes of depressive disorder.

Women who have experienced postpartum depression are at risk of suffering further episodes of illness, both following subsequent deliveries and also unrelated to childbirth (Kumar et al., 1984; Philipps & O'Hara, 1991; Nott, 1987; Warner et al., 1996). After one postpartum episode the risk of recurrence, defined as an episode of illness meeting criteria for DSM-IV major depression, is 25% (Wisner et al., 2002).

Culture & Postpartum Depression

Childbirth & Culture

With a few notable exceptions, most of the relevant research into psychiatric disorders associated with childbearing has been confined to developed countries, mainly in Western Europe and North America (Kumar, 1994).

The physiology of human pregnancy and childbirth is the same all over the world, but the event is conceptualized and structured, and hence, experienced by the mother and by her social group very differently (Kumar, 1994). It has been purported that postpartum depression simply does not exist within certain cultures. Stern and Kruckman (1983) wrote that a review of the anthropological literature revealed surprisingly little evidence of the phenomenon identified in Western diagnoses as postnatal depression.

This conclusion was lent some support by anecdotal observations in Nigeria (Kelly, 1967), South Africa (Chalmers, 1988) and India (Gautam, Nijhawan, & Gehlot, 1982) that nonpsychotic depression after childbirth is rare in such societies. However, higher maternal morbidity rates may result in under-reporting.

It should be noted that these conclusions were based on observational data, and not all studies combined ethnographic field observations with formal diagnostic testing. One should also be aware of the danger of cultural stereotyping, and of the possibility that the presence of disorders such as postpartum depression in particular cultures may go unrecognized (Kumar, 1994).

Aims of Cross Cultural Research

Stern and Kruckman (1983) draw attention to the fact that the defining criteria for depression may vary greatly across different cultural settings, so the problem cannot simply be resolved by applying a Western concept of depression to other cultures.

One of the primary aims of cross-cultural comparative research is to examine whether there are differences in clinical presentation in different settings. Cox (1999) discussed the presentation of ‘Amikiro’ in Ugandan women; where women express the urge to eat their baby. Whilst Western clinical interviews do

not specifically question women about their desire to eat their baby, through careful questioning, as in semi structured interviews, it would be possible to detect psychological dysfunction in cultural and ethnic settings in which it has been suggested that postpartum depression does not occur.

Similarly, it is important to try to find out whether observed differences in childrearing practices have a mitigating or an exacerbating influence on the possible adverse effects of maternal postnatal illness on the child's psychological development.

Results from Cross-Cultural Studies

Large scale studies comparing rates of postnatal depression across cultures have found similar rates to those reported in Western Europe and North America. Cox's (1983) Ugandan study has shown that African mothers become depressed at a similar rate to those in developed nations. Dennerstein et al. (1989) and Thorpe et al. (1992) have found similar rates of depression after childbirth in comparisons of Australian, Italian and Dutch mothers and of Greek and English mothers, respectively. Jadresic et al. (1992) reported similar prevalence rates in Chilean women, and Shah et al. (1971) found that a quarter of women attending a well baby clinic in India were diagnosed as suffering from "neurotic disorders with a post-partum onset" (and hence likely to be depressive disorders).

One does need to consider the possible limitations of using existing assessment tools within different ethnic groups. For example, Watson & Evans (1986) compared three ethnically different groups of childbearing women using the General Health Questionnaire (GHQ). They found that some questions e.g. 'have you ever felt that life isn't worth living' were perceived as meaningless by Bengali mothers who could not conceive of such a possibility.

Cultural Differences in the Presentation of Psychiatric Symptoms

It is well established that there are marked cultural differences in the way that psychiatric symptoms are presented to health professionals (Kleinman, 1996) with some groups more likely to somatize symptoms.

Upadhyaya et al. (1989) found no marked differences in rates of depression or level of somatic and psychological symptoms between groups of indigenous white and Asian women presenting to clinics in India. However, when their reasons for consulting their doctors were examined, the Asian women consulted exclusively for somatic symptoms whereas the white mothers were more likely to present with depression. This may be linked into women's reluctance to admit to symptoms of depression because of cultural expectations of motherhood.

The rituals adopted within some cultures following childbirth have been purported to protect against the development of postpartum depression. For example, Okano et al. (1992) have drawn attention to the Japanese custom of Satogaeri Bunben in which the new mother stays with her own mother for several weeks after giving birth. They have suggested that there may be a link between the onset of depression and having

to leave the maternal home. Therefore a perceived, or actual, lack of social support may contribute to the onset of the illness.

Summary

There are no major differences in the rates of postnatal depression in the few cross-cultural comparisons that have so far been reported. Differences rather than similarities in incidence rates might have been expected and these important studies need replication and extension in other settings.

Some of the rituals practiced within cultures may be protective against postnatal depression because they provide social and practical support for the new mother.

Psychiatric disorders are heavily stigmatized within many cultures, and women and their families may be reluctant to seek help from health professionals, preferring to try and manage the illness with no outside help. Health professionals may only be consulted when the woman is so severely ill that the family can no longer cope.

The use of standardized assessment tools may not be culturally relevant within certain ethnic groups; there may also be reluctance to discuss issues such as libido or feelings of self-harm as they are deemed inappropriate to be discussed outside of the family.

Risk Factors for Postpartum Depression: Results from Quantitative Studies

Variables which have been investigated as potential risk factors for postpartum depression will be presented and discussed; the results from studies using quantitative and qualitative methods will be presented and discussed separately.

Identification & Evaluation of Literature on Risk Factors for Postpartum Depression

The literature on postpartum depression is vast: in order to identify articles of good quality which reported risk factors for postpartum depression, the following criteria were devised:

Initial Inclusion & Exclusion Criteria

1. Precise definition of postpartum depression stated.

   Studies had to clearly describe both the diagnostic and temporal criteria of postpartum depression used. The diagnoses must have been made according to standard operational diagnostic criteria such as RDC, DSM-IV or ICD-10, and the onset of the illness must have been within one year of parturition. This temporal definition ensured that all studies pertaining to depression related to childbirth were included. Only cases of nonpsychotic depression were included.
2. Method of Assessment for Postpartum Depression Specified.

Studies had to specify both the means of assessment for postpartum depression i.e. self-report or clinical interview and the instrument used i.e. the name of questionnaire or interview. These measures needed to have proven reliability and validity.

3. Human studies
4. The study must be empirical and not merely anecdotal evidence or narrative.
5. English language
6. Studies published from 1990 – 2002 (seminal studies conducted prior to 1990 identified through key references, general reading and authors' expertise in area were also included)
7. Timing of Assessment.

   The timing of the assessment of depression must have been clearly stated and be greater than 2 weeks postpartum to avoid the reporting of postpartum blues.
8. Definition of Risk Factors.

   The variables of interest were defined and measured using appropriate methods. The statistical relationship between the variable and postpartum depression was clearly stated.

Search & Retrieval Strategies

Online searching of databases

Based on advice from Marina Englesakis (MLIS) an Information Specialist in Libraries & Information Services at the University Health Network, we used 20 keywords and employed sophisticated search term strategies including mapping to subject headings and truncation of keywords to include all variants in order to identify all relevant literature.

As researchers from different national backgrounds we are acutely aware of different uses of terminology between North America and Europe (for example, postpartum, postnatal, maternal or puerperal depression). We ensured that all terms in common use to describe depression in the postpartum period were included.

The search terms and databases used to identify potential studies of interest are shown in Tables 1-2 and 1-3. In order to retrieve pertinent studies limits were placed on the search:

Published from 1990 – 2002

English language

Human studies

Table 1-2. Search terms used to identify relevant literature

postpartum depress:.mp.	post partum depress:.mp
postnatal depress:.mp.	post natal depress:.mp.
baby blues	postpartum blues
post partum blues	depression, postpartum
postpartum dysthymia	post partum dysthymia
puerperal disorders	puerperal psychosis
postpartum psychosis	post partum psychosis
risk factors	contribute:.mp.
prevent:.mp.	protect:.mp.
protective factors	perinatal depression

Table 1-3. Databases searched using search terms to identify relevant literature

Medline	PsychInfo
CINAHL- Cumulative Index to Nursing and Allied Health Literature	Campbell Collaborative Reviews
EMBASE- Evidence-Based Medicine	DARE- Database of Abstracts of Reviews of Effectiveness
CDSR-Cochrane Database of Systematic Reviews	Dissertation Abstract International
CCTR- Cochrane Controlled Trials Register	Evidence Based Medicine Reviews-American College of Physicians Journal Club
ProQuest	Web of Science
HealthStar	Social Science Citation Index
U.K. Department of Health Research	National Health Register
WHO Reproductive Health Library	PubMed
CDC-MMWR(Centers for Disease Control and Prevention-Morbidity and Mortality Weekly Report)	

The initial search results generated over 946 potential studies. Excluding duplicates and applying the inclusion criteria, a total of 137 studies were identified and retrieved.

Although a search of unpublished or 'grey' literature was conducted, when the inclusion criteria were applied and likely papers reviewed it was determined that they did not contribute to the existing published literature. Therefore only studies published in peer-reviewed journals were retrieved.

Although the database searches should have identified all recent papers, for completeness the tables of contents in 42 key journals within the area, for the last two years were searched, to ensure that suitable papers had not been omitted (see Appendix C). No additional relevant studies were found.

Assessment of Quality

Our strategy for critically appraising retrieved articles incorporated standard procedures, as shown in Table 1-4.

Table 1-4. Critical Appraisal Guide

An assessment of the quality, relevance and contribution of the study to existing literature
The scientific rigour and appropriateness of the research study design
Sampling methods used to identify and recruit subjects
How postpartum depression was measured i.e. self report or diagnostic interview
The reliability and validity of the instrument used to measure postpartum depression
The timing of the assessment for depression i.e. was it long enough after delivery to exclude assessing 'baby blues'
Evaluation of bias throughout the research process
Evaluation of statistical methods including data collection, use of statistical tests and reporting of data
Appropriateness of conclusions and recommendations drawn from the study

Interpretation & Analysis of Data

Meta Analyses of Risk Factors for Postpartum Depression

The literature search identified two recent meta-analyses of risk factors for postpartum depression which had been conducted by O'Hara & Swain (1996) and Beck (2001). The Beck paper was a follow-up to a previous meta-analysis published in 1996. Due to the importance of these two papers, a discussion of their methodologies and inclusion criteria will follow.

O'Hara & Swain (1996) stated that the main purpose of undertaking the meta-analysis was to quantify the relationships between postpartum depression (defined on the basis of depression severity or diagnosis) and a variety of non-biological or hormonal risk factors.

A meta-analytic approach allows the investigator to summarize, in a quantitative fashion, the results of disparate studies. It yields an effect size that describes the strength of a relationship between two variables that were obtained in at least two independent studies.

Effect sizes may vary from 0 (zero), which indicates a random relationship, to numbers greater than 1. Effect sizes within the meta-analytic studies of O'Hara & Swain (1996) and Beck (2001) are reported in terms of Cohen's *d*, with a *d* of 0.2 indicating a small relationship, 0.4 indicating a moderate relationship and 0.8 indicating a strong relationship (Cohen, 1977). In the postpartum depression literature effect sizes usually are in the order of 0.2 to 0.5, 'small to medium' effect sizes according to Cohen (1977).

A second yield from a meta-analysis is a confidence interval, usually a 95% confidence interval. This confidence interval describes the range in which the 'true' population effect size lies, with 95% confidence.

Finally, it is often noted that there is considerable heterogeneity in effect sizes across investigations. Sometimes this heterogeneity can be explained by specific variables that differ across the studies such as different methods used to assess depression or the country in which the study was conducted.

Analysis of New Data within the Context of Published Meta-Analyses

Our search and retrieval strategy allowed us to identify studies that had previously been identified and included in the two meta-analyses, studies that had been conducted or published subsequent to the meta-analyses, and those that had not been included by Beck (2001) or O'Hara & Swain (1996).

Table 7 at the end of the chapter summarizes the results of a selection of primary studies not included in the meta-analyses. These studies have been highlighted because they add to the literature in distinct ways. There are a number of large scale studies in which there was adequate power to detect effects (e.g. Forman et al.,2000; Warner et al.,1996). Other studies had employed systematic consecutive sample recruitment which reduce the risk of bias (e.g. Johnstone et al.,2001). Data were also obtained from samples in which there is a dearth of work, for example diverse cultural groups including Chinese (Lee et al.,2000) and Indian (Patel et al., 2002) women.

The results of these new studies were analyzed in relation to the findings of the meta-analyses. Due to the power of the meta-analyses to detect effects we could comment on whether the newer studies supported the findings of the meta-analyses or whether the interpretation of the contributing factors should be changed as a result of new evidence. For the purposes of this chapter non-significance was defined as the confidence interval containing 0. A summary of the findings of the meta-analyses, and the findings of newer studies are provided in Tables 8 – 10 at the end of the chapter.

It is important, therefore, to be aware of the content of the two meta-analyses, each of which shall be discussed in turn.

Summary of Published Meta-Analyses

Beck 2001: Summary of Criteria & Methods

The search and retrieval strategies employed by Beck were based on Cooper's (1989) five approaches:

1. The ancestry and descendancy approach (i.e. ways of checking prior and subsequent publications from the reference lists in articles)
2. Online computer searching (see table below)
3. Informal contacts at professional research conferences and
4. Abstracting services
5. The keywords used to search, limitations on articles retrieved and the databases these terms were used in are shown below in Figure 1-2.

Figure 1-2. Keywords, databases and years included in Beck's meta-analysis (2001)

Databases Searched by Beck	Limits	Keywords
CINAHL Medline Psych Info Eric Popline Social Work Abstract Sociological Abstracts Dissertation abstracts JREF	Articles published between 1990 – 1999	"postpartum depression" "postnatal depression" "puerperal depression" "predictors AND risk factors"

In order to be included in the meta-analysis studies had to meet the following criteria:

- The study assessed the relationship between postpartum depression and predictor variables
- The mood disorder was measured after 2 weeks postpartum to comply with DSM-IV (American Psychiatric Association, 1994) diagnostic criteria and also to avoid measuring blues inadvertently
- Adequate statistics were present in the results to allow meta analytic calculations
- If an F or χ^2 statistics was used to analyze data, a degree of freedom of 1 was necessary to avoid unfocused, general comparisons between several means.

Beck identified a total of 84 studies which met her inclusion criteria. The methodological quality of each paper was assessed in terms of:

- Sampling methods
- How postpartum depression was measured i.e. self report or diagnostic interview
- The reliability and validity of the instrument used to measure postpartum depression
- Research design
- Timing of the assessment for postpartum depression
- Data analysis

O'Hara and Swain 1996: Summary of Criteria & Methods

O'Hara and Swain gave details of their inclusion criteria but did not explicitly state their retrieval strategies. In order to be included in O'Hara and Swain's analyses, the study had to fulfill the following criteria:

- A reported statistical relationship between the variable of interest and postpartum depression.
- The variable of interest was assessed either during pregnancy or delivery.
- Subjects were recruited through random or quasi-random sampling techniques.
- Depression was assessed after at least two weeks postpartum (to avoid confounding of postpartum blues).

- Postpartum depression was assessed using a validated or standardized measure.

O'Hara and Swain identified a total of 77 studies which met their inclusion criteria.

Evaluation of the studies

Although the identification and retrieval strategies for the meta-analyses appear similar, there are differences that may result in differing scientific quality of the papers retrieved. The databases included in Beck's search (ibid) are more obscure and return higher numbers of unpublished work and dissertations. With few exceptions, the studies identified by O'Hara and Swain (ibid) had all been published in peer-reviewed journals and subjected to methodological and statistical review. Within Beck's meta-analysis (ibid) a number of less rigorous definitions of concepts were used, for example, 'life stress' rather than objective measures of 'life events'. Similarly, a number of factors were examined which were measured postpartum and be reflective of the mother's depressed mood, including self-esteem and measures of child temperament. It was on occasion unclear which measures or questionnaires had been used and whether there were differences in scores depending on which measure had been used. O'Hara and Swain (ibid) explicitly stated and differentiated between measures used within studies and commented for each variable on the heterogeneity of study results.

Therefore, more weight would be given to the findings of O'Hara and Swain due to the more rigorous analytical methods used, and the confidence with which the results can be interpreted based on the detail provided on methods of assessment, sample size and differences between countries or cultures.

A summary of each of the studies are shown in Tables 1-5 and 1-6, including the number of studies and subjects included, where the studies were conducted, the variables examined and their significance as well as limitations and comments on the studies.

Table 1-5. Summary of Meta-Analysis by O'Hara and Swain (1996)

Number of Studies & Subjects	Where Studies Conducted	Variables Examined	Effect Size Level	Comments
77 Studies 12, 210 Subjects	Europe N. America Asia Japan Australasia	**Sociodemographic**	Non-significant	Very well designed meta-analysis Well powered to detect effect sizes All factors measured antenatally so higher predictive power All studies used standardized instruments to measure risk factors High number of studies used clinical interviews for diagnosis Limitation: 3 / 77 studies were unpublished
		Clinical Factors Depression during pregnancy Prenatal anxiety Previous history of depression Family history of depression	 Moderate/Strong Moderate Moderate No association	
		Obstetric & Infant Related Factors Obstetric & Pregnancy complications	 Small	
		Psychological Factors Cognitive attributions Neuroticism	 Small Moderate	
		Social Factors Life events Social support Marital status Marital relationship (DYAS) Income	 Moderate Moderate No association Small Small	

Table 1-6. Summary of Meta-Analysis by Beck (2001)

Number of Studies & Subjects	Where Studies Conducted	Variables Examined	Effect size Level	Limitations
84 Studies Approx. 3000 Subjects	Europe N. America S. America Asia Japan Australasia Africa Middle East China	**Clinical Factors** Depression during pregnancy Prenatal anxiety Maternity blues Previous history of depression	 Moderate Moderate Small Moderate	30 / 84 unpublished studies Unable to calculate accurate sample size due to high number of unpublished studies Factors measured postpartum may be influenced by mother's depressed mood Could not establish which instruments or measures had been used for some variables Some factors may reflect mood state i.e. self-esteem, reports of child behaviour Few studies used clinical interviews to diagnose depression Cannot establish whether there are differences in scores when different instruments used Less rigorous definitions of concepts used compared to O'Hara & Swain
		Obstetric & Infant Related Factors Unplanned / unwanted pregnancy Childcare stress Infant temperament	 Small Moderate Moderate	
		Psychological Factors Self-esteem	 Moderate	
		Social Factors Life stress Social support Marital status Marital relationship Socioeconomic status	 Moderate Moderate Small Moderate Small	

Contributing Factors to Postpartum Depression

Multifactorial Models of Psychiatric Illness

When interpreting studies of aetiological factors of psychiatric illness, it important to remember that it is highly likely that there is no one single cause. Genetic and biological studies of mood disorders indicate that they are complex diseases, and even if an individual has a genetic vulnerability or predisposition to developing depression, there have to be experiential and environmental factors which interact to cause the illness (Dubovsky & Buzan, 1999). Therefore, it is likely that a number of these factors play a role in the development of postpartum depression.

Biological Factors

Although the focus of the meta-analyses focused on non-biological risk factors it is necessary to provide an overview of biological theories of postpartum depression.

The rapid decline in the levels of reproductive hormones that occur after delivery has been proposed as a possible aetiology of postpartum affective disorders (Wisner et al., 2002). Following childbirth, progesterone and estrogen levels fall rapidly, returning to prepregnancy levels within 3 days. When estrogen falls after birth, prolactin, which has risen during pregnancy, is no longer blocked and lactation is initiated. Suckling by the infant stimulates the secretion of oxytocin. The usual cyclical variation of androgens is absent during both pregnancy and lactation. Plasma corticosteroids reach a peak during labour and decrease significantly within 4 hours postpartum. Thyroid function returns to prepregnancy levels approximately 4 weeks after delivery (Robinson et al., 2001).

There is no conclusive evidence for a relationship between the various neurotransmitter systems, free or total tryptophan levels, or cortisol levels and symptoms of postpartum depression (Llewellyn, Stowe, & Nemeroff, 1997). However, Harris (1996) showed a minor association of postpartum depression and thyroid dysfunction in thyroid antibody positive women.

Although it has been suggested that postnatal depression is caused by low levels of progesterone or estrogen or high levels of prolactin, no consistent relationships have been found (Harris, 1994; Hendrick, Altshuler, & Suri, 1998).

A recent study by Bloch, Schmidt, Danaceau et al. (2000) tested the hypothesis that a subgroup of women may have a differential sensitivity to reproductive hormones, and that in this group normal endocrine events related to childbirth may trigger an affective episode. In order to test the hypothesis, they used a scaled down model to simulate some of the hormonal events of pregnancy and childbirth. They tested two groups of women, 8 of whom had a history of postnatal depression and 8 women without a history of postnatal depression. Both groups of women were given a gonadotrophin releasing hormone agonist to

simulate the supraphysiological gonadal steroid levels of pregnancy over an eight week period and then these were withdrawn to simulate childbirth.

Five of the eight women with a history of postpartum depression developed significant affective symptoms during the withdrawal period; none of the 8 women who did not have a history of postnatal depression experienced any mood symptoms during the withdrawal period. The authors concluded that these data provided support for the involvement of estrogen and progesterone in the development of postnatal depression in a subgroup of women.

Limitations

It should be noted that there are several methodological problems that hampered studies on the biological basis of postpartum disorders (Robinson et al., 2001). Early researchers could not accurately assay hormones, particularly free unbound plasma concentrations. Psychological rating scales differed between studies, some were confounded by the normal physical symptoms of the puerperium, and as such were obviously inappropriate measures of the maternal mental states. Blood sampling often took place at inappropriate times, ignoring activities such as breastfeeding which can alter hormone levels. Seasonal variations in hormones and circadian rhythms were often overlooked. Studies that examined one hormone were inadequate because of complex endocrine interactions (Robinson et al., 2001).

As previously discussed, postpartum depression is best thought of as having multiple causal factors. Even if some women are more susceptible to hormonal changes the role of environmental factors in the development of the illness needs to be considered.

Obstetric Factors

Obstetric factors can include pregnancy related complications such as preeclampsia, hyperemesis, premature contractions as well as delivery related complications, such as emergency / elective caesarean, instrumental delivery, premature delivery and excessive bleeding intrapartum.

Obstetric Complications

In their meta-analysis, O'Hara and Swain (1996) included 13 studies comprising over 1350 subjects that examined the effects of obstetric factors. They concluded that obstetric factors had a small effect (0.26) on the development of postpartum depression.

More recent studies, (published after the meta analyses or those not included in the meta analyses) found no overall statistically significant relationship between obstetric factors and postpartum depression.

For example, two large independent studies by Warner et al. (1996) (N=2375) and Forman et al (2000) (N=5292), found no statistical relationship between obstetric complications and postpartum depression based on both multivariate and univariate analysis.

Similarly, Johnstone et al. (2001) (N=490) reported no association between obstetric history, labour and delivery, complications of pregnancy and infant details and postpartum depression. They did, however find a nonsignificant trend between antepartum hemorrhage, forceps, multiparity and postpartum depression. Josefsson et al. (2002), in their case control study (n=396), reported a similar nonsignificant association between delivery complications and depression at 6 months postpartum.

Caesarean Section

The evidence relating to Caesarean section and postpartum depression suggests that there is no association between the two variables. Warner et al. (1996) and Forman et al. (2000) found no significant association between elective or emergency caesarean section and subsequent postpartum depression. Johnstone et al. (2001) reported a nonsignificant trend between postpartum depression and caesarean section.

Boyce et al (1992) found a highly significant correlation between caesarean section and developing postpartum depression at 3 months. They reported that women within their study who had an emergency caesarean section had more than six times the risk of developing postpartum depression. These results were supported by Hannah et al. (1992) who found a strong association between caesarean section and postpartum depression at 6 weeks.

It is highly probable that the positive findings reported merely reflect statistical trends. Within such large samples, one would expect by probability alone to achieve statistically significant results for 1 in 5 tests. However, when the results from the meta-analysis and a further 9,000 subjects are considered there is no significant relationship between Caesarean section and the onset of postpartum depression.

Unplanned / Unwanted Pregnancy

Beck (1996) examined the effects of an unplanned or unwanted pregnancy and developing postpartum depression. She included the results from 6 studies that comprised 1200 subjects, and found a small effect size. These results were supported by Warner et al. (1996) who found a significant relationship between unplanned pregnancy and depression at 6 weeks postpartum in a sample of 2375 women.

Unplanned or unwanted pregnancy as a risk factor for postpartum depression should be interpreted very cautiously. It does not measure the woman's feelings towards the growing fetus but merely the circumstances in which the pregnancy occurred.

Breast Feeding

The evidence relating to breastfeeding as a potential risk factor is equivocal. Warner et al. (1996) found that **not** breastfeeding at 6 weeks postpartum was significantly associated with postpartum depression (N=2375). Hannah et al. (1992) supported these findings in a sample of 217 women. However, Forman et al. (2000) (N=5292) did not find any relationship between not breastfeeding and postpartum depression.

The reasons for the equivocal findings reported between breastfeeding and the onset of postpartum depression may reflect non-illness related factors, such as the woman's preference or hospital policy rather than an aetiological relationship.

Summary

In summary, the evidence suggests that obstetric factors make a small but significant contribution to the development of postpartum depression. Despite the fact that most of the studies were prospective, self reported, multi site sampling with large sample sizes, the timing of the evaluation of postpartum depression differed between studies. O'Hara and Swain (1996) indicated that using relatively short time frames (e.g. 2 weeks) had significant effects on the strength of the relationship between putative risk factors and postpartum depression.

However, there was heterogeneity between the methods of assessment of depression. Those studies that diagnosed depression using interview methods found a weak association between obstetric complications, but depression assessed through self-report measures was moderately related to these factors. These findings suggest that while higher level of obstetric complications may be weakly associated with a diagnosis of postpartum depression, they are moderately associated with higher levels of self reported depressive symptomatology.

One must be very cautious when interpreting the effects of obstetric factors in developing postpartum depression. Some of the variables measured may not be truly independent but rather influenced by extraneous variables. For example, the number of Caesarean sections performed can vary within a hospital because of consultants' differing clinical views as to when the procedure is appropriate. The number can then differ between hospitals, regions or provinces, and certainly between countries. In South Africa and Australia for example, women can request delivery by Caesarean section which is not the case within the United Kingdom. Consequently, the rates of Caesarean sections differ greatly between these countries. Similarly, rates of breastfeeding or attitudes towards breastfeeding may differ within cultures and countries. Therefore the results may be reflecting trends within the sample rather than a true relationship between postpartum depression and obstetric variables.

Clinical Factors

Clinical factors relate to variables such as having previously experienced psychiatric symptoms, having a family history of psychiatric illness, as well as measures of affect during pregnancy.

Previous History of Depression

O'Hara and Swain's (1996) meta analyses included 14 studies of approximately 3000 subjects which examined the mother's previous psychiatric history and postpartum depression. Beck's (2001) meta-analyses included 11 studies which examined approximately 1000 subjects.

The results of both meta-analyses found that a previous history of depression was a moderate to strong predictor of subsequent postpartum depression. Subsequent studies consistently report that women with a previous history of postpartum depression are at increased risk of developing postpartum depression (Johnstone et al., 2001; Josefsson et al., 2002).

Family History of Depression

O'Hara and Swain (1996) combined data from 6 studies (approximately 900 women) to evaluate the association between a family history of depression and women's experience of postpartum depression.

The results showed no association between family history and postpartum depression. It was **not** a significant predictor of postpartum depression within the samples (δ = 0.05, 95% CI –0.06 / 0.16). *(Note: this finding does **not** apply to postpartum psychosis where family history is a significant predictor of postpartum psychosis).* However, Johnstone et al. (2001) did find an increased risk of postpartum depression in 490 women with a family history of psychiatric illness.

One of the difficulties in establishing a positive family history of mental illness is that it requires the subject to be aware of relatives with psychiatric problems, and for them to be willing to disclose that information. It may be that there is relationship between family history and postpartum depression but the methods of eliciting accurate information are not available at present.

Mood During Pregnancy

O'Hara and Swain (1996) included 13 studies comprising over 1000 subjects for their analyses, whilst Beck included data from 21 studies which included over 2300 subjects.

The results found that depressed mood during pregnancy was a moderate – strong predictor of postpartum depression. These results have been replicated in a number of subsequent studies (Johnstone et al., 2001; Josefsson et al., 2002; Neter et al.,1995).

O'Hara further examined the relationship and found the association between depression during pregnancy and postnatally when assessed via self-report was stronger (δ = 0.84; 95% CI 0.75 / 0.93) than the relationship when assessed via an interview (δ = 0.39; 95% CI 0.22 / 0.56).

Prenatal Anxiety

A relationship had previously been reported between measurable anxiety during pregnancy and the level of postpartum depressive symptoms (Hayworth et al., 1980; Watson et al., 1984).

These findings were supported by Beck who analysed the results of 4 studies, a total of 428 subjects, and found anxiety to be a moderate predictor of postpartum depression.

O'Hara and Swain (1996) analyzed the results of 5 studies, comprising nearly 600 subjects and also found that anxiety during pregnancy was a strong-moderate predictor of subsequent depression following childbirth. These findings were supported in the subsequent studies by Johnstone et al. (2001) and Neter et al. (1995) who found that higher levels of anxiety strongly predicted levels of postpartum depressive symptomatology.

Summary

There's little question that past history of psychopathology puts women at risk for depression in the postpartum period. The average effect size is one of the largest for the risk factors of postpartum depression.

Consistent with the findings related to previous psychiatric history, depressed mood and anxiety during pregnancy were also found to be a significant predictor of postpartum depression, particularly when indexed by a self-report measure.

These findings are important because they indicate that dysphoric mood during pregnancy is not just associated with dysphoric mood after delivery but with the clinical syndrome of postpartum depression as well. These findings are consistent across studies and should be taken as important risk factors for the development of postpartum depression.

Psychological Factors

Psychological Constructs

O'Hara and Swain (1996) compared maternal personality characteristics within studies to examine whether they were associated with postpartum depression.

Neuroticism

Neurotic disorders can be defined as psychological disorders that are usually distressing but allow one to think rationally and function socially. The neurotic disorders are usually viewed as ways of dealing with anxiety. The term 'neurotic' is no longer used within psychiatric classification systems, although it is commonly included in personality questionnaires as a measure of psychological distress.

Neuroticism was measured within 5 studies in over 550 women antenatally and found to be a weak to moderate predictor ($\delta = 0.39$; 95% CI 0.21 / 0.57) of postpartum depression (O'Hara & Swain, 1996).

These results have been replicated in subsequent studies. Lee et al. (2000) found that elevated scores on neuroticism were significantly associated with women with postpartum depression. Johnstone et al. (2001) found that women who were defined as 'being nervy', 'shy-self-conscious' or a 'worrier' through

questionnaires, were significantly more likely to develop postpartum depression. These are more modern terms for psychological constructs similar to neuroticism.

Cognitive attributional style

Cognitive attributional style was also measured as a predictor of postpartum depression. Barnett and Gotlib (1988) discuss how negative cognitions are good indicators of depression, and that depressive attributions coincide with a depressed mood.

O'Hara and Swain analyzed 13 studies of over 1300 women and found that a negative cognitive attributional style was weakly related to postpartum depression (δ0.24, 95%CI 0.18 / 0.31).

Summary of Clinical Factors & Psychological Constructs

The effect between neuroticism, assessed during pregnancy, and subsequent postpartum depression is clear. O'Hara and Swain found that the effect was more pronounced when depression was defined as a syndrome and was assessed through a clinical interview.

In contrast, a negative cognitive attributional style was more strongly related to high levels of depressive symptomatology when assessed through self-report.

O'Hara and Swain highlight that these findings, together with those regarding past history of psychopathology and depression during pregnancy, strongly suggest that there is a continuity of psychiatric disturbance that extends back many years before a woman's pregnancy and into the postpartum period. This disturbance may be chronic or episodic. It may reflect disturbance in which the morbidity is relatively minor or very severe. The question that remains is the extent to which, or whether, childbearing per se affects the timing or severity of postpartum disturbance.

Social Factors

Life Events

The relationship between life events and the onset of depression is well established (Brown & Harris, 1978). Experiences such as the death of a loved one, relationship breakdowns or divorce, losing a job or moving home are known to cause stress and can trigger depressive episodes in individuals with no previous history of affective disturbance.

Pregnancy and birth are often regarded as stressful life events in their own right, and the stressfulness of these events may lead to depression (Holmes & Rahe, 1967). However, some researchers have studied the effects of additional stressful life events that women experience during pregnancy and the puerperium. These events, thought to reflect additional stress at a time during which women are vulnerable, may play a causal role in postpartum depression.

Paykel et al (1980), using a retrospective design, found that negative life events classified as moderate to severe were associated with increased probability of being diagnosed as clinically depressed.

O'Hara, Rehm and Campbell found that high levels of life events from the beginning of pregnancy until about 11 weeks postpartum were associated with higher levels of depressive symptomatology and a greater likelihood of being diagnosed with postpartum depression (O'Hara, Rehm, & Campbell, 1982; O'Hara, Rehm, & Campbell, 1983).

Hopkins, Campbell and Marcus (1987) found no association between life events and postpartum depression. At least two other large studies have not found an association between life events and postpartum depression (Holmes et al., 1967; Kumar et al., 1984).

One of the difficulties of assessing a possible relationship between life events and the onset of depression postpartum is the study design. Retrospective collection of data may lead to over reporting of life events as subjects (perhaps subconsciously) try to link a stressful event as a possible cause of the illness. The prospective collection of data eliminates this source of bias, as the outcome of postpartum depression is not known a priori.

In the recent meta-analyses, O'Hara and Swain took values from 15 studies, comprising data on over 1000 subjects that had prospectively recorded data on life events. They found a strong-moderate relationship between experiencing a life event and developing postpartum depression ($\delta = 0.60$, 95% CI: 0.54 / 0.67).

However, there was heterogeneity between studies which related to where the study was conducted: studies undertaken in Britain and North America showed strong associations between postpartum depression and recent life events, while Japanese studies showed a nonsignificant association. It is not clear why this should occur. The more recent study conducted by Lee et al. (2000) in Hong Kong did not find an association between life events and postpartum depression.

The method used to assess depression also explained heterogeneity of findings: interview based assessments demonstrated a moderate relationship with life events while self report evaluations yielded a significantly stronger relationship. The findings show that stressful events, even though they occur during pregnancy and not in the puerperium, are clear risk factors for developing postpartum depression.

Beck (2001) used a less rigorously defined measure of 'life stress' to assess studies which measured perceived stress within pregnancy and the early puerperium. She included 16 studies of over 2300 subjects and found a moderate relationship between perceived life stress and postpartum depression. Higher levels of perceived life stress were associated with postpartum depressive symptomatology.

Social Support

Receiving social support through friends and relatives during stressful times is thought to be a protective factor against developing depression (Brugha et al., 1998) and several earlier studies have evaluated the role of social support in reducing postpartum depression.

Social support is a multidimensional concept. Sources of support can be a spouse, relatives, friends or associates. There are also different types of social support, for example *informational* support (where advice and guidance is given), *instrumental* support (practical help in terms of material aid or assistance with tasks) and *emotional* support (expressions of caring and esteem).

Researchers have also examined the effects of *perceived* support (a person's general perception or belief that people in their social network would provide assistance in times of need) and *received* support (where supportive exchanges may be directly observed or measured by asking people). Received support is complex and multidimensional, as one needs to measure both the quantity of support given (i.e. the frequency of supportive acts, number of network members) and also the quality of the support received (Collins et al.,1993; Dunkel-Schetter & Bennett, 1990; House & Kahn, 1985; Neter et al., 1995).

Studies have consistently shown a negative correlation between postpartum depression and emotional and instrumental support (Beck, 1996a; Menaghann, 1990; Richman et al., 1991; Seguin et al., 1999). Two recent studies have found that perceived social isolation (or lack of social support) was a strong risk factor for depressive symptoms postpartum (Forman et al., 2000; Seguin et al., 1999).

However, there may be differences between perceived and received social support. Logsdon et al (2000) studied social support among African-American low income pregnant women. Although she found a significant relationship between perceived support and depressive symptomatology following delivery, there was no relationship between received support and postpartum depression. This confirmed the findings of earlier studies.

O'Hara, Rehm and Campbell (1983) studied *perceived* social support and found that depressed women reported that their spouse was deficient in providing instrumental and emotional support following delivery. However, these women did not identify their spouse as being less supportive during pregnancy any more than nondepressed women. To a lesser degree, friends and parents of the depressed women were also perceived as being less supportive during the puerperium, but not during the pregnancy. These results were confirmed in a second study (O'Hara, 1986).

Cutrona (1984) found that several dimensions of perceived social support assessed during pregnancy were predictive of the level of postpartum depressive symptoms. Surprisingly, the strongest predictor concerned the availability of companionship and feeling of belonging to a group of similar others, rather than the quality of intimacy with the husband.

O'Hara and Swain (1996) examined 5 studies in which overall levels of social support were measured during pregnancy, based on over 500 subjects. They found that there was a strong negative relationship between social support and postpartum depression (δ = -0.63; 95% CI –0.75 / -0.51). This suggests that women who do not receive good social support during pregnancy are more likely to develop postpartum depression. This concept was confirmed in a recent study which argued that receiving informational support

from a large number of social network members was protective against postpartum depression (Seguin et al., 1999).

In order to try and further examine the concept of social support, O'Hara and Swain specifically looked at perceived support from the baby's father. They found a moderate strength relationship (δ = -0.53; 95% CI –0.67 / -0.39) however there was heterogeneity in findings from studies dependent upon how depression was assessed.

They concluded that poor support from the baby's father, per se, was not significantly associated with being diagnosed with postpartum depression however poor support was strongly negatively related with the severity of depressive symptoms.

Summary

Social support, as it is manifest during pregnancy, is a relatively potent risk factor for postpartum depression, particularly in the form of high levels of depressive symptomatology. The one study that assessed overall social support during pregnancy and used an interview based depression outcome found a very strong association between social support and depression.

Both overall social support during pregnancy and support from the baby's father, in particular, were associated with high levels of postnatal depressive symptomatology.

Studies have consistently found differences between perceived and received social support in women with postpartum depression. These differences may be accounted for, in part, by the fact that depressed individuals tend to view everything more negatively, including their perceptions of level of support.

The majority of studies have focused on cross sectional samples of pregnant women, however there may be special groups for whom social support may be pertinent. For example, there is a dearth of work examining the role of social support within low income groups (Lee et al., 2000; Logsdon et al., 2000; Neter et al., 1995; Seguin et al., 1999). Similarly, the effects of social support among Aboriginal and immigrant women is an area which needs further research.

Psychosocial Aspects of Childbearing

The effects of parenthood on all aspects of the mother's psychosocial functioning should not be underestimated. Robinson and Stewart (2001) discuss how, in many cases, the family system must be reorganized, and many couples adopt more traditional roles. The mother usually tends to do the greater share of parenting tasks, and the parents must decide how their new roles will affect their previous work patterns and implement the necessary changes. With the added burden of childcare, the relationship between the partners often suffers, and there is less time for socializing. A supportive relationship with the father can help mitigate the stresses of being a new mother. These stresses should be borne in mind when evaluating the role of factors in the development of postpartum depression.

Marital Relationship

Several well designed studies (Braverman & Roux, 1978; Kumar et al., 1984) have reported an increased risk of postpartum depression in women who experience marital problems during pregnancy. Hopkins et al.(1987) however failed to confirm this finding. It has been mentioned previously that women with postpartum depression perceived their husbands to be less supportive than women who were not depressed, but these differences were apparent only postpartum and not during pregnancy (O'Hara, 1986; O'Hara et al., 1983).

Marital relationship was measured between studies using a variety of different instruments, the limitations of which need to be briefly discussed. The range of measurement went from a simple Likert scale on which women indicate their level of satisfaction with the relationship, to standardized measures such as the Dyadic Adjustment Scale (DYAS) (Spanier, 1976). The assessment could take place during an interview or via a self-report design.

The fact that the meta-analyses were based on data measured pre partum eliminates potential reporting bias. It was previously found that women with postpartum depression rated their husbands as less supportive, however it is difficult to know whether their depressive symptomatology negatively influenced their perceptions of their relationship. These results are free from such bias as the measures were taken prepartum.

Global measures

Studies which assessed marital relationship using more global measures such as Likert scales or through open questions were assessed in both meta analyses. Beck included 14 studies comprising over 1500 subjects, while O'Hara and Swain included 8 studies of over 950 subjects.

Beck found a moderate association between poor marital relationship and postpartum depression, whilst O'Hara and Swain reported a small negative relationship.

It was interesting that differing methods of assessment produced different effect sizes. Marital relationship assessed via interviews was not as predictive as when measured via self -report. The reason for this is unclear, but may relate to reluctance to discuss the nature of the relationship with an interviewer, but through the anonymity of a questionnaire it is easier. It could also reflect increased sensitivity within questionnaire measures.

DYAS.

O'Hara and Swain (1996) examined the association between mother's prepartum relationship with their spouse, focusing on studies which used the Dyadic Adjustment Scale (DYAS). The DYAS is a self-report measure which has proven psychometric properties, and is a standardized measure of the quality of the marital relationship.

The results from 6 studies, on over 1100 subjects which used the DYAS indicated a small but significant negative relationship between marital satisfaction on the DYAS and incidence of PPD (δ = -0.13; 95% CI – 0.20 / -0.06).

Summary

Marital adjustment assessed during pregnancy with a standard self report measure (DYAS) is much more predictive of postpartum depression than by interview.

Marital adjustment assessed with more global scales showed the opposite pattern. O'Hara and Swain argue that this could be because a psychometrically refined measure such as the DYAS may be a more sensitive predictor of depression than a global rating scale. However, experiencing difficulties in the marital relationship, or having a poor marital relationship during pregnancy is a predictor of subsequent postpartum depression.

Socioeconomic Status

The role of socioeconomic status in the aetiology of mental health disorders and depression has received much attention. Socioeconomic deprivation indicators such as unemployment, low income and low education have been cited as risk factors in mental health disorders (Bartley, 1994; Jenkins, 1985; Patel et al., 1999; Weich et al., 1997; World Health Organization, 2001). Recent studies from North America, Latin America and Europe reported that depression is more common among poorer countries (World Health Organization, 2001).

Socioeconomic deprivation has also been studied in the aetiology of postpartum depression. Beck (2001) examined 8 studies of 1732 subjects and found a small effect (0.19 - -0.22) between socioeconomic status and postpartum depression. However, it is unclear which indicators of socioeconomic status were included in this meta-analysis.

O'Hara and Swain (1996) examined 14 studies of over 1650 subjects and also reported a small effect (-0.141). They concluded that indicators such as low income, mother's occupation, and being of lower social status had a small but significant predictive relationship to postpartum depression. However, other sociodemographic variables including marital status, pregnancy employment status and parity did not show any significant relationship to postpartum depression.

Recent studies which were not included in the meta-analyses found that unemployment and financial strain were significantly associated with postpartum depression (Lee et al., 2000; Patel et al., 2002; Seguin et al., 1999; Warner et al., 1996).

Lee (2000), Patel (2002) and Seguin (1999) specifically studied low income populations within India, China and Canada respectively and found that financial strain was an important risk factor in postpartum depression within these populations.

Summary

In summary, there is evidence that low socioeconomic status has a small effect on the development of postpartum depression. However, one of the methodological limitations in the literature is the different criteria used to determine indicators of 'low income'.

In addition, most studies have focused on relatively homogenous samples of middle to upper class women, with few studies examining the relationship between socioeconomic indicators and postpartum depression among lower socioeconomic groups within both developed and developing countries.

Infant Variables

By definition, variables relating to the infant can only be measured postpartum. As such their predictive power is subject to bias, particularly in relation to the objectivity of the mother's reports.

It has previously been reported that child related factors were associated with postpartum depression. Cutrona (1983) reported that higher levels of childcare related stressors were associated with higher levels of depressive symptomatology, while Hopkins, Campbell and Marcus (1987) found that having a difficult baby or a baby with neonatal complications was associated with a diagnosis of postpartum depression.

Beck (2001) studied two variables related to the infant, child temperament and childcare stress. She found that childcare stress and having an infant with a difficult temperament were moderately predictive of postpartum depressive symptomatology (N=789).

It has been found that mothers suffering from postpartum depression give more negative descriptions of their children than control mothers and report more behavioural problems in their infants (Murray, 1988). Therefore, the mothers' symptoms may be a source of bias in the reporting of infant characteristics.

Factors not Associated

The results of the meta-analyses by O'Hara and Swain (1996) and Beck (2001) found that the following were **not** significantly associated (i.e. the confidence interval contained 0) with the development of postpartum depression:

- Maternal age (O'Hara & Swain, 1996: 26 studies, N >10,000)
- Level of education (10 studies, N >7,000)
- Parity (7 studies, N >2,000)
- Length of relationship with partner (6 studies, N > 800)
- Sex of child * (15 studies, N > 8,000)

* Sex of Child - Studies conducted within Western societies have found no association between the sex of the child and postpartum depression. However, recent studies provide evidence from India (Patel et al.,2002) (n=171) and China (Lee et al.,2000) (n=220) which suggest that spousal disappointment with the sex of the baby, specifically if the baby is a girl, is significantly associated with developing postpartum

depression. Therefore, the parent's reaction to the sex of the baby may be a potential risk factor for postpartum depression within certain cultural groups.

Table 1-7. Summary of Select Primary Studies Not Included in Meta-Analyses

Author, Year, Country	Study Design	Population Sampled	Measures & Timing of Assessment	Contributing Factors Examined	Significant Factors / Outcome	Limitations / Comment
Boyce, 1992, Australia	Prospective Using questionnaire Community based Follow- up at one, three and six months postpartum	192 women in antenatal clinic in first trimester 188 women divided into 3 groups by method of delivery: 21 - emergency caesarean section; 49 forceps delivery;118 spontaneous vaginal delivery	1st trimester - The Interpersonal sensitivity Measure. Eysenck Personality Inventory (EPI). The Intimate Bond Measure. The Beck Depression Inventory (BDI). Edinburgh Postnatal Depression Scale (EPDS) was used at 1, 3 & 6 months after delivery.	Emergency caesarean section Forceps delivery Spontaneous vaginal delivery	Emergency caesarean section at three months postpartum significantly associated with PPD.	Sampling bias, no recruitment date information homogeneous and small sample group. No information on previous or family history of psychiatric illness. Reasons for the emergency caesarean section not discussed and may be risk factors for depression.
Patel, 2002, India	Prospective Follow-up Questionnaires Community based	270 pregnant women recruited during their third trimester from a district hospital in Goa, India.	Interview at recruitment with GHQ (Konkani version), 6-8 weeks, and 6 months after childbirth. EPDS (Konkani version) was used at 6-8 weeks and 6 months follow-up. Semistructured interview for sociodemographic data, obstetric history, gender-based variables	Antenatal and postnatal depression Obstetric history Economic and demographic characteristics Gender-based variables (preference for male infant, presence of marital violence).	Significant Factors: Psychological morbidity during the antenatal period. Economic deprivation and poor marital relationships Gender of the infant	New data from India Prospective Interesting cultural finding regarding gender of child Validation of EPDS which allows comparison between countries

Author, Year, Country	Study Design	Population Sampled	Measures & Timing of Assessment	Contributing Factors Examined	Significant Factors / Outcome	Limitations / Comment
Lee, 2000, China	Prospective longitudinal study Community based Questionnaires and interview	220 Chinese women were consecutively recruited from University teaching hospital, Hong Kong between 1996 & 1997.	The clinician-administered Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders (SCID-NP). Interview, BDI and GHQ on the second day after delivery 6 weeks postpartum - SCID-NP.	Sociodemographics Socio-economic status Previous medical, gynecologic and obstetric history Circumstances during pregnancy Perinatal factors Psychosocial factors	Significant Factors: Depression during pregnancy, elevated depression score at delivery, prolonged postnatal 'blues' Temporary housing accommodation, financial difficulties, abortions, past psychiatric disorders, elevated neuroticism score Spouse disappointment with the gender of the newborn.	'Prolonged blues' is a measure of PPD so result not valid. New data from Hong Kong Allows for cultural comparisons Gender of child findings interesting regarding culture

Author, Year, Country	Study Design	Population Sampled	Measures & Timing of Assessment	Contributing Factors Examined	Significant Factors / Outcome	Limitations / Comment
Johnstone, 2001, Australia	Prospective Multi-site Urban and rural community sample Questionnaires	504 women were recruited antenatally from participating hospitals. Complete data were obtained from 490 women between 1995 &1996.	EPDS was used eight weeks after delivery. Population-based surveillance system: to examine obstetric factors Postnatal questionnaire: sociodemographic information Structured Clinical Interview for DSM-III-R (SCID): personality	Obstetric risk factors: complications of pregnancy, labour and delivery, infant details. Sociodemographic data Personality Psychiatric history Recent life events	None of the obstetric variables were significantly associated with PPD. Significant risk factors: Sociodemographic variables Personality Psychiatric history Recent life events	Comparatively small sample size Population based system reduces self-report bias Interpretation of personality data may be limited
Josefsson, 2002, Sweden	Prospective Case-control Multi-site Community based Questionnaire	Cohort of 1489 pregnant women assessed for depression at 6-8 weeks postpartum during 1997-1999. 132 women who scored >10 on EPDS at 6-8 weeks postpartum selected as index group. Control group comprised 264 women without depressive symptoms as assessed by EPDS.	EPDS (Swedish version) was administered at 6-8 weeks and 6 months after delivery.	Sociodemographic status Pregnancy, and perinatal events Previous medical, gynecologic and obstetric history	Significant Risk Factors: Pregnancy complications, Sick leave during pregnancy and a high number of visits to the antenatal care clinic. Antenatal depressive symptoms and PPD were significantly correlated. No significant association between parity, sociodemographic data, mode of delivery and delivery complications.	This study includes previous medical, gynecologic and obstetric history as a risk factor which is novel. Prospective design reduces bias Adequately powered sample. Multi-centre, prospective, case-control design – very well designed.

Author, Year, Country	Study Design	Population Sampled	Measures & Timing of Assessment	Contributing Factors Examined	Significant Predictors / Outcome	Limitations/ Comments
Warner, 1996, U.K.	Prospective Questionnaires to identify women with postpartum depression	2375 women recruited from postnatal wards on two maternity units between 1993 & 1995. Completed screening questionnaire	The Edinburgh Postnatal Depression Scale (EPDS) was administered, six to eight weeks after delivery	Sociodemographic and obstetric risk factors: Unplanned pregnancy Sub fertility Primiparity Complicated pregnancy Caesarian section Mean birth weight Baby on special-care Not breast feeding (6 weeks)	Four independent variables were found to be significantly associated with an EPDS above threshold (> 12) Unplanned pregnancy Not breast-feeding Mother unemployed i.e. no job to return to following maternity leave Head of household unemployed	High proportion of women had complications No data on previous or family psychiatric history Factors not measured antenatally therefore less predictive power Findings may be reflecting characteristics of the sample rather than risk factors Variables influenced by extraneous variables
Forman, 2000 Denmark	Prospective Community based Follow-up using questionnaires	Cohort of women attending antenatal program at Aarhus University Hospital 5252 women who gave birth between 1994&1995, completed all follow-up questionnaires	The EPDS administered 4 months after delivery 4 months postpartum : psychological distress measured by GHQ	Sociodemographic factors Marital status Working status History of psychiatric disease Family history of psychiatric disease Level of psychological distress in 3rd trimester Perceived social isolation Antenatal events including obstetric & gynecological factors	Significant predictors of PPD: Psychological distress in late pregnancy Perceived isolation during pregnancy High parity Positive history of psychiatric illness	High rate of non-responders, who scored higher on risk factors – sample bias Results pertain to women with lower risk factors and who were more motivated to respond/complete follow-up questionnaires Antenatal factors rated, higher predictive power

Contributing Factors to the Development and Recovery from Postpartum Depression: Metasynthesis of Qualitative Studies

The use of qualitative methodologies within health studies enables the researcher to gain an 'insider's perspective' of illness, which would be impossible through quantitative methods. A number of studies have employed such methods in order to increase our level of understanding of the experience of living with, and through, postpartum depression.

Beck (2002) recently published a metasynthesis of 18 studies of postpartum depression, published during the 1990s, which used qualitative methodologies. A metasynthesis refers to "the theories, grand narratives, generalizations, or interpretive translations produced from the integration or comparison of findings from qualitative studies" (Sandelowski, Docherty, & Emden, 1997). The 'meta' refers to translating qualitative studies into each other, or interpreting the data.

Beck identified four overarching themes or perspectives involved with postpartum depression:

1. Incongruity between expectations and reality of motherhood
2. Spiraling downward
3. Pervasive loss
4. Making gains.

She stressed that mothers can move back and forth between these differing perspectives, and they can be in more than one at any time. Within the context of the metasynthesis, these factors were highlighted by the women as: i) contributing to the onset of the illness and ii) aiding in their recovery. Each of these perspectives shall be presented and discussed in turn, with reference made to the original studies where appropriate.

Incongruity Between Expectations and Reality of Motherhood

Nicolson (1990) has written extensively about the 'dangerous myths' operating among both professionals and lay people which equate becoming a mother with total fulfillment and happiness. Eight of the 18 studies in the metasynthesis centred on the role that conflicting expectations and experiences of motherhood played in the development of postpartum depression. Women held unrealistic expectations which were shattered by their own experiences as mothers (Mauthner, 1999). They became disillusioned with motherhood, as they perceived they had failed to fulfill their expectations of themselves as the 'perfect mother' (Berggren-Clive, 1998).

Emotions of despair and sadness started the mothers' spiral downward into postpartum depression. The women in Berggren-Clive's study described the incongruity between their expectations and reality of motherhood in seven areas: labour and delivery, life with their infants, self as mother, relationship with partners, support from their family and friends, life events and physical changes (Berggren-Clive, 1998).

Nicolson (1990) and Beck (2002) argue that because society perpetuates these myths of the perfect mother, and motherhood as a totally fulfilling and happy experience, the women believed that no other mothers shared their negative reactions to childbirth. Therefore, they viewed themselves as 'bad' or 'abnormal' mothers, which led to fear of moral condemnation and being labeled by others as failed mothers.

Mauthner (1998) identified 3 kinds of conflict in mothers' narratives, all of which centred on their desire to be the 'perfect mother'. One area of conflict concerned how to care for their infant regarding topics such as breastfeeding and being employed. The second set revolved around women's depression and unhappiness, which was in direct conflict with their expectations that they would be happy with their infants. The third concerned expectations that they could cope with their new infants, when the reality was that they needed help.

For each woman, the conflicts she experienced depended on what her notion of what makes 'a good mother' and what aspects of motherhood were especially significant to her. Parity influenced the conflicts that some of the women struggled with: the conflicts that the 12 first time mothers struggled with centred on trying to live up to their image of the 'perfect, ideal mother' (Mauthner, 1999). In contrast, the 6 multiparas were well aware that there was no such thing as the perfect mother and their conflicts revolved around trying to live up to their expectations of being able to cope with their newest child.

It appears that cultural context can intensify these conflicting expectations and experiences of motherhood. If there are high cultural expectations of motherhood, then this could exacerbate women's feelings of helplessness and being a bad mother. This may have particular relevance for women who are no longer living in their home country and are separated from their immediate family who would usually provide practical and emotional support during the postpartum period.

Spiraling Downward

Mothers began the downward spiral of postpartum depression as their feelings worsened. All 18 studies in the metasynthesis addressed aspects of this downward spiral.

<u>Emotional</u>

The emotions did not include just depression and sadness (Wood, Thomas, Droppleman, & Meighan, 1997), but women covertly suffered through a myriad of emotions such as anger, guilt, being overwhelmed, anxiety and loneliness. Some mothers also experienced obsessive thoughts or cognitive impairment and contemplated harming themselves or their infants, which led to increased feelings of anxiety and guilt. The women who admitted to thoughts of selfharm and suicide spoke about how suicide provided a glimmer of hope 'to the end of the nightmare' and 'the blackness'.

<u>Isolation / Loneliness</u>

Women consistently talked about a profound sense of isolation and loneliness. They frequently felt discomfort at being around others and their belief that no one really understood what they were experiencing (Beck, 1992). They socially withdrew to escape a potentially critical world (Semprevivo, 1996).

Social factors appeared to modify the sense of isolation. Primiparas felt physically isolated from other mothers, but multiparas had already developed a network of other mothers from their previous children (Mauthner, 1995).

Depending on the reaction of their coworkers to the mothers' return to employment, the mothers' sense of isolation could be increased or decreased. Some mothers valued the companionship of their work colleagues but at the same time felt they were missing out on the network of mothers who stayed at home. Others felt an increased sense of isolation because their colleagues disapproved of working mothers.

Guilt

Women lived with the burden of guilt for many different reasons: being a bad mother (Mauthner, 1995; Mauthner, 1999; Mauthner, 1998) failure to be the perfect mother (Wood et al., 1997), and lack of an emotional connection with their baby (Beck, 1996b; Sluckin, 1990). The mothers who thought about harming their infants (Beck, 1992; Semprevivo, 1996) were so horrified by these thoughts that they were consumed by guilt.

Pervasive Loss

Loss of control was identified as a central theme in 15 out of the 18 studies. The loss of control related to all aspects of their life including thought processes, emotions, and relationships.

Nicolson's (1999) study described how loss of autonomy and time were precursors to feeling out of control because the women no longer had time to consider themselves or process their daily experiences. This in turn led to a sense of loss of self, loss of their former self and a loss of identity.

Women discussed how the illness led to loss of relationships, with their partners, children and family members (Morgan, Matthey, Barnett, & Richardson, 1997). Some women wanted their partners 'to be able to read their minds' and take some initiative in helping them, whilst others felt that admitting their feelings was a sign of personal inadequacy and failure as a mother (McIntosh, 1993). If they did admit to their feelings the women also risked being misunderstood, rejected or morally condemned by their loved ones. Because women with postpartum depression felt 'different' and 'abnormal' compared to other mothers, they withdrew from these relationships and spoke of the difficulty about being surrounded by other mothers (Mauthner, 1995).

Making Gains

Surrendering was a big part of the mother's recovery from postpartum depression. The concept of 'surrendering' in this context meant realizing something was very wrong and they needed to get help. Unfortunately, women's initial interactions with health professionals caused more distress: women reported that their concerns were ignored or minimized and feelings of disappointment, frustration, humiliation and anger were commonplace.

In McIntosh's study (1993) only 18 of the 38 women interviewed had sought help. The main reasons that they gave included feeling embarrassed and ashamed, and the fear of being labeled as a 'bad mother' and the stigma associated with being ill at what should be a happy time.

Attendance at postpartum depression support groups created hope within the women as they realized that they were not alone (Berggren-Clive, 1998) the women found solace in these groups (Beck, 1992). Their feelings of isolation and loneliness were dissipated as they could identify with others and openly question the ideals of motherhood they struggled to fulfill (Mauthner, 1995).

Reintegration & Change

Adjusting the unrealistic expectations that the mothers had for themselves was cited by most women in Berggren-Clive's study (1998) as one means of freeing themselves from the constraints they had imposed on themselves. The women shifted expectations with respect to themselves as mothers, partners and family members which was necessary in rebuilding self.

The mothers began to regain control of their lives as they recognized their needs and found ways of meeting them. It was a slow, unpredictable process however and as the depression lifted, the women began to mourn the lost time that they would not be able to recapture with their infants.

Many of the women described an increased sense of strength following their experience of postpartum depression, as recovery involved acceptance or resolution of the conflicts they had experienced during their transition to motherhood (Mauthner, 1998).

Summary of Metasynthesis of Qualitative Literature

The results from the metasynthesis show that there were a number of areas that the women highlighted as contributing towards the development of their postnatal depression.

The majority of women found that the reality of motherhood was very different from their expectations. They felt overwhelmed which in turn led to feelings of inadequacy as a mother and associated guilt that they could not fulfill their social role.

The women also felt that they could not confide in their loved ones for fear of being labeled as a bad mother, or moral condemnation. Feelings of isolation and that no one else could identify with their

experience were commonplace and added to the feelings of inadequacy. For some women this was compounded by cultural expectations of motherhood, particularly if they were not in their home country.

As part of their recovery, women spoke about the positive effects of attending a support group – how it created hope as they could identify with other women in a similar situation and have their experiences normalized.

Women frequently did not admit to symptoms or seek help because of the stigma associated with being ill, or because they did not recognize their feelings as pathological. Beck argues that health care professionals have a responsibility to take an active role in alleviating the harmful myths surrounding motherhood that are prevalent within society.

Summary of Risk Factors for Postpartum Depression

The puerperium is well established as a time of increased risk for the development of serious mood disorders, although the prevalence of overall depression is similar to that of age and social class matched women who have not born children in the previous year.

Postpartum depression is the most common complication of childbearing, affecting 10 – 15% of women, and as such represents a considerable public health problem affecting women and their families. Research studies have shown a number of risk factors to be associated with the development of postpartum depression.

All women are susceptible to developing depression following childbirth. However, women who have one or more of the following factors have a significantly increased risk of experiencing the illness. All of these factors, except measures of infant temperament and childcare stress, were measured antenatally to reduce risk of bias and were found to be predictors of postpartum depression, even after controlling for differences in assessment methods for depression, sampling frames and where the research was conducted.

All of these factors can be ascertained during pregnancy as potential risk factors, and high risk women identified for close follow-up and possible interventions.

These are shown in order of magnitude below, as defined by Cohen's effect size. That is, the strongest down to the smallest predictors of postpartum depression. A summary of the studies which provided these data are given in Tables 1-8 – 1-10 at the end of this chapter.

Strong to Moderate

- Depression during pregnancy
- Anxiety during pregnancy
- Stressful recent life events
- Lack of social support (either perceived or received)
- Previous history of depression

Moderate

- High levels of childcare stress
- Low self-esteem
- Neuroticism
- Difficult infant temperament

Small

- Obstetric and pregnancy complications
- Cognitive attributions
- Quality of relationship with partner assessed using DYAS.
- Socioeconomic status

No effect

- Ethnicity
- Maternal age
- Level of education
- Parity
- Gender of child (within Western societies)

The risk factors identified from quantitative studies are well established: they are methodologically robust and have been replicated within numerous studies across different sample populations. However, it is also useful to study the individual views of women who have experienced postpartum depression, as their view may inform possible service provision and educational needs.

A meta-analysis of qualitative studies of postpartum depression found that women's experiences of motherhood differed from their expectations quite markedly. Many women felt overwhelmed which led to feelings of inadequacy as a mother, and the associated guilt that they could not fulfill their social role.

It appears that cultural context may intensify these conflicting expectations and experiences of motherhood. If there are high cultural expectations this could exacerbate women's feelings of helplessness and being a bad mother.

This may have particular relevance for mothers who are no longer living in their own country and are separated from family who would usually provide practical and emotional support during postpartum period. Lack of social support is a well established risk factor for postpartum depression, and immigrant women may be at higher risk of depression because they are culturally and physically separated from their support systems. Recent studies from India and China indicated that disappointment at having a baby girl may also contribute to postpartum depression. Health care professionals should be aware that the gender of the child may be an additional risk factor within some cultures.

Women frequently spoke of their sense of isolation; the feeling that no else could understand or could identify with what they were going through. The women also felt that they could not confide in their loved ones for fear of being labeled as a bad mother. However, as part of their recovery, women spoke about the positive effects of attending a support group: how it created hope as they could identify with other women in a similar situation and have their experiences normalized. This could also be culturally sensitive to alleviate feelings of isolation that immigrant women may feel.

The stigmatization of mental illness remains a major problem: women frequently did not admit to symptoms or seek help because of the stigma associated with being ill or because they did not recognize their feelings as pathological.

Gaps in the Literature

The synthesis of literature on factors associated with developing postpartum depression identified particular areas in which more work needs to be done.

Lower socioeconomic status is an established risk factor for non-puerperal depression. The experience of pregnant women in low income populations, who may already be at higher risk of depression, is under researched at present. Their interactions with, and access to, health care services, and opportunities for social networks and support may differ significantly from higher income groups.

The rate of postpartum depression within the general population is 10-15%, however the rates in teenage mothers have been reported to be as high as 26%. This group requires further study as there may be factors which contribute to both teenage motherhood and subsequent depression.

The use of standardized assessment tools for depression may not be suitable with all cultural groups and researchers need to be culturally sensitive. The experience of postpartum depression outside of a woman's home country requires further work. These women may be at higher risk because of lack of social support, cultural expectations of motherhood and a reluctance to disclose psychiatric symptoms and receive care from health professionals.

Conclusions

Although there is no archetypal model of a woman at risk of developing postpartum depression, researchers have attempted to produce a ‘composite’ which is useful within a clinical framework (O'Hara et al., 1996). Although an over-simplification, it is useful to portray the results from the synthesis of literature on risk factors of postpartum depression.

Her clinical history may reveal previous experience of psychiatric illness, and she may have suffered from depressive or anxious symptoms during pregnancy. She may be experiencing difficulties through stressful life events and a poor marital relationship. She perceives that her partner, family and friends are not as supportive as they could be (although this may not be true).

Table 1-8. Strong Predictors of Postpartum Depression

Predictor variable	Total Number of Subjects	Level of Effect & Direction of New Data
Depression during pregnancy		
O'Hara & Swain 1996	>1000 (13 studies)	STRONG / MODERATE
Beck 2001	2, 305 (21 studies)	Significant association, supporting findings
Josefsson et al 2002	132 probands 264 controls	Significant association, supporting findings
Johnstone et al 2001	490	Significant association, supporting findings
Neter et al 1995	108	Significant association, supporting findings
Anxiety		
O'Hara & Swain 1996	>586 (5 studies)	STRONG / MODERATE
Beck 2001	428 (4 studies)	Significant association, supporting findings
Johnstone et al 2001	490	Significant association, supporting findings
Neter et al 1995	108	Significant association, supporting findings
Life events		
O'Hara & Swain 1996	>1015 (15 studies)	STRONG / MODERATE * *within Western societies but not Japanese samples
Beck 2001	2324 (16 studies)	Significant association, supporting findings
Lee et al 2000	220	No association with life events within Chinese sample
Social support		
O'Hara & Swain 1996	> 521 (5 studies)	STRONG / MODERATE
Beck 2001	2692 (27 studies)	Significant association, supporting findings
Forman et al 2000	5292	Significant association, supporting findings
Seguin et al 1999	68	Significant association, supporting findings
Previous history of depression		
O'Hara & Swain	>2896 (14 studies)	STRONG / MODERATE
Beck 2001	991 (11 studies)	Significant association, supporting findings
Joseffson et al 2002	132 probands 264 controls	Significant association, supporting findings
Johnstone et al 2001	490	Significant association, supporting findings

Table 1-9. Moderate Predictors of Postpartum Depression

Predictor Variable	Total Number of Subjects	Level of Effect & Direction of New Data
Neuroticism		
O'Hara & Swain 1996	>552 (5 studies)	MODERATE
Lee et al 2000	220	Significant association, supporting findings
Johnstone et al 2001	490	Significant association, supporting findings
Childcare stress		
Beck 2001	789 (7 studies)	MODERATE
Self-esteem		
Beck 2001	570 (6 studies)	MODERATE
Infant temperament		
Beck 2001	1,056 (10 studies)	MODERATE

Table 1-10. Small Predictors of Postpartum Depression

Predictor variable	Total Number of Subjects	Level of Effect & Direction of New Data
Obstetric & Pregnancy complications		
O'Hara & Swain 1996	>1366 (13 studies)	SMALL
Warner et al	2375	No statistical relationship found
Forman et al	5292	No statistical relationship found
Johnstone et al	490	No statistical relationship found
Josefsson et al	132 prob and 264 control	No statistical relationship found
Boyce et al 1992	188	Significant association found with Caesarean Section
Hannah et al 1992	217	Significant association found with Caesarean Section
Cognitive attributions		
O'Hara & Swain 1996	>1318 (13 studies)	SMALL
Relationship with partner assessed using (DYAS)		
O'Hara & Swain 1996	>1133 (6 studies)	SMALL
Socioeconomic status and income		
O'Hara & Swain Beck Lee 2000, Patel 2002, Seguin 1999, Warner et al 1996	>1668 (14 studies) 1,732 (8 studies) Small studies	SMALL Small effect size reported supporting findings "Important" risk factor

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CHAPTER 2: DETECTION, PREVENTION AND TREATMENT OF POSTPARTUM DEPRESSION

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Citation:

This chapter should be cited as:
Dennis, C.-L. (2003). Detection, prevention, and treatment of postpartum depression. In Stewart, D.E., Robertson, E., Dennis, C.-L., Grace, S.L., & Wallington, T. (2003). Postpartum depression: Literature review of risk factors and interventions.

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Financial assistance by Health Canada

CHAPTER 2: DETECTION, PREVENTION, AND TREATMENT OF POSTPARTUM DEPRESSION

Table of Contents

CHAPTER SUMMARY

Introduction

Childbirth represents for women a time of great vulnerability to become mentally unwell, with postpartum mood disorders representing the most frequent form of maternal morbidity following delivery. While postpartum depression is a major health issue for many women from diverse cultures, this affective condition often remains undiagnosed resulting in limited management. The objective of this chapter is to critically review the literature to determine the current state of scientific knowledge related to the detection, prevention, and treatment of postpartum depression.

Methods

Databases relating to the medical, psychological and social science literature were searched using specific inclusion criteria and search terms to identify studies, which examined screening procedures and/or the effect of various preventive and treatment interventions on depressive symptomatology among expectant and new mothers. Randomized controlled trials, meta-analyses, and several studies with diverse designs were identified and critically appraised in order to synthesize the current findings. The search resulted in the identification of numerous postpartum depression detection studies and over 58 trials evaluating preventive and treatment intervention. The criteria used to evaluate the interventions outlined in this chapter were based on the standardized methodology developed by the Canadian Task Force on Preventive Health Care.

Key Findings

Today, both general and postpartum-specific depression instruments have been utilized to measure depressive symptomatology. By far the most widely used instrument in postpartum depression studies and for population-based screening is the Edinburgh Postnatal Depression Scale (EPDS), a 10-item self-report scale specifically designed to screen for postpartum depression in community samples. While this measure has been validated among diverse cultures resulting in varying sensitivity and specificity values, diversity and inconsistency in assessment procedures have hampered the meaningful comparison of studies and compromised the development of a cumulative body of knowledge. Although these psychometric limitations are not unique to the EPDS, the methodological explanations justify only some of the discrepancies found between the EPDS translation and validation investigations. Significant differences in the proportion of high EPDS scores across different cultural contexts were noted in an international multi-site study suggesting that cultural factors merit more attention. In addition, further research is required to determine if indeed the EPDS is the most appropriate screening instrument as new measures are being developed based on qualitative investigations.

While determining the most appropriate instrument to detect postpartum depression is challenging, immense efforts have also been undertaken to identify pregnant women who are at-risk of developing postpartum depression such that secondary preventive interventions may be implemented. A recent

systematic review of 16 antenatal screening studies, where sufficient data was available to calculate specific screening properties, was conducted. No screening instrument met the researchers' outlined criteria for routine application in the antenatal period and the unacceptably low positive predictive values in the included studies make it difficult to recommend the use of screening tools in routine antenatal care. It is noteworthy that the predictive power of maternal mood in the immediate postpartum period (e.g., first 2 weeks postpartum) in the development of postpartum depression has consistently been reported and warrants further investigation.

The overarching question – whether screening and subsequent management is superior to management based on usual means of identification as 'high-risk'– is controversial. It is equivocal whether further support beyond identification improves management adherence and clinical outcomes. The trade-offs between benefits and harms are an important component in the decision of whether to screen or not. Currently, there is limited information about the harms of screening and despite a wealth of studies concerning the prevalence of postpartum depression and screening accuracy, key elements of the evidence base for screening remains insufficiently developed. As such, a strong recommendation to implement screening procedures cannot be justified until further research has been completed.

The long-term consequences of postpartum depression suggest preventive approaches are warranted. Manipulation of a risk factor may improve the associated likelihood of developing postpartum depression through many different ways. The most obvious is to decrease the amount of exposure to a given risk factor or, alternatively, reduce the strength or mechanism of the relationship between the risk factor and postpartum depression. However, translating risk factor research into predictive screening protocols and preventive interventions has met with limited success, as complex interactions of biopsychosocial risk factors with individual variations need to be contemplated. Numerous studies have been examined in this review with the diverse aetiology of postpartum depression reflected in the broad range of approaches considered. Although theoretical justifications for many of these approaches have been presented, methodological limitations render intervention efficacy equivocal with scant evidence available to guide practice or policy recommendations. Despite the recent upsurge of interest in this area, many questions remain unanswered resulting in a myriad of research implications. Similarly, definite conclusions cannot be reached about the relative effectiveness of treatment approaches due to the lack of well-designed investigations. Randomized controlled trials with large and representative samples are needed to compare different treatment modalities, examine the effectiveness of individual treatment components, and determine which treatments are most useful for women with different risk factors or clinical presentations of postpartum depression.

Implications

Even though diverse measures have been created to detect depressive symptomatology, the development of a postpartum depression screening program requires careful consideration. Evidence-based decisions need

to be made regarding: (1) the most accurate screening test that is culturally sensitive, quick to administer, easy to interpret, and readily incorporated into practice; and (2) health care system issues such as cost-effectiveness, potential harm, and policies for referral. Auspiciously, research suggests postpartum depression is amenable to preventive and treatment interventions, thus providing a rationale for the development of a screening program. However, limited research has been conducted demonstrating screening improves clinical outcomes. Furthermore, few well-designed randomized controlled trials have been conducted to effectively guide practice and policy recommendations and further research is warranted if evidence-based programs are to be implemented. As there is no single etiological pathway by which women develop postpartum depression, it is improbable that a single preventive/treatment modality will be effective for all women. A multifactorial approach, which combines the contributions of the psychological, psychosocial, and biological factors, is likely to be most beneficial as it recognizes various etiological factors and individual variations.

LIST OF TABLES

Introduction

Childbirth represents for women a time of great vulnerability to become mentally unwell, with postpartum mood disorders representing the most frequent form of maternal morbidity following delivery (Stocky & Lynch, 2000). These affective disorders range in severity from the early maternity blues to postpartum psychosis, a serious state affecting less than 1% of mothers (Evins & Theofrastous, 1997). Along this spectrum is postpartum depression, a condition often exhibiting the disabling symptoms of dysphoria, emotional lability, insomnia, confusion, anxiety, guilt, and suicidal ideation. Frequently exacerbating these indicators are low self-esteem, inability to cope, feelings of incompetence, and loneliness (Beck, 1992; Mills, Finchilescu, & Lea, 1995; Ritter, Hobfoll, Lavin, Cameron, & Hulsizer, 2000). While postpartum depression is a major health issue for many women from diverse cultures (Affonso, De, Horowitz, & Mayberry, 2000) and has well documented public health consequences, this affective condition often remains undiagnosed resulting in limited management. The objective of this chapter is to critically review the literature to determine the current state of scientific knowledge related to the detection, prevention, and treatment of postpartum depression.

Methods

Search Strategy

Databases searched for this specific review included Medline, PubMed, CINAHL, PsycINFO, EMBASE, ProQuest, the Cochrane Library, and the WHO Reproductive Health Library from 1966 to present. As part of the quality assessment process and to measure the capture rate of relevant references, tables of contents for key journals were hand searched for the past 2 years, reference lists of included studies and relevant reviews were examined, and key postpartum depression researchers from the U.S. and Australia were contacted via email. The initial search was based on the identification of titles containing appropriate combination of keywords (Appendix D). Finally, all abstracts related to the combination of the keywords postpartum/postnatal depression and randomized controlled trials were reviewed to ensure all potentially significant interventions were reviewed. In total, approximately 500 abstracts were examined for inclusion suitability.

Inclusion/Exclusion Criteria

While there is considerable postpartum depression research in progress, the literature review involved systematically searching for published peer-reviewed articles available in English from 1990 to 2002, although select earlier studies were included based on methodological quality and/or the absence of more recent work. Research studies that focused on postpartum depression (i.e., inception of depression within the first year postpartum) were reviewed; other childbirth-related mental health disorders (i.e., pregnancy or

postpartum anxiety, maternity blues, puerperal psychosis) were not appraised. Finally, research studies evaluating preventive interventions must have incorporated a postpartum depression outcome assessment beyond the first week postpartum to be included.

Data Abstraction and Critical Appraisal

In the initial stage of the search process, peer-reviewed publications were identified and potentially relevant abstracts, which met the predetermined eligibility criteria, were subsequently extracted for further examination. Research articles were then selected and assessed in a more rigorous manner to determine inclusion suitability. These articles were either included or excluded and further sub-grouped. The critical review process consisted of assessing the disorder definition (i.e., diagnostic/screening criteria used), population sampled (i.e., inclusion/exclusion criteria, recruitment process, sample size, participant characteristics), research design (i.e., control for potential bias, method and timing of assessment, statistical analysis, outcome measures, length of follow-up), level and quality of evidence, and critical analysis of variations between findings of pertinent studies.

Methodology for Synthesis

Interventions included were evaluated according to the published criteria used by the Canadian Task Force on Preventive Health Care (CTFPHC, 2003). See Overall Methodological Framework. Based on this methodology, the following chapter is comprised of three distinct sections: (1) detecting postpartum depression, (2) preventive interventions, and (3) treatment options.

Section I: Detection of Postpartum Depression

Postpartum depression is a serious mood disorder affecting many women from diverse cultures. Despite the long-standing recognition of this condition, it represents a largely undetected form of maternal morbidity. The reasons for this are twofold. First, women are often reluctant to seek professional help (Small, Brown, Lumley, & Astbury, 1994). Even though mothers have various interactions with health professionals in the postpartum period, they are frequently unwilling to disclose emotional problems, particularly depression (Brown & Lumley, 2000). One explanation for this hesitancy may be the popular myth that equates motherhood with happiness and the idealisation of the "good mother" where feelings of joy are emphasised while unhappiness is minimised. In addition, many women have difficulty understanding the problems they are experiencing, often assuming these struggles are a normal part of motherhood. For these women, the onset of symptoms may be attributed to causes other than depression, such as fatigue or relationship difficulties (Small et al., 1994; Whitton, Appleby, & Warner, 1996). Conversely, some women recognize the symptoms as depression but fear the potential help-seeking consequences such as being labelled mentally ill or an unfit mother. Even after women have made the decision to seek professional help they frequently report

feelings of embarrassment, disappointment, and frustration as health professionals may minimize their symptoms or portray their experiences as normal (Beck, 1993). It should also be recognized that not knowing where to obtain assistance is another important help-seeking barrier (McIntosh, 1993). Finally, family members may discourage women from seeking help, as in some cultures it is unacceptable to admit to depressive symptoms or discuss such difficulties external to the family context (Matthey, Barnett, & Elliott, 1997; Okano, Nagata, Hasegawa, Nomura, & Kumar, 1998).

Health professionals may also contribute to the under-diagnosing of postpartum depression. Many health professionals have limited training in the assessment or management of postpartum depression. As such, they often do not recognize the presenting symptoms as indicating depression or they may feel uncertain about how to effectively assist and are therefore reluctant to raise such issues. However, research suggests that screening may significantly assist health professionals in their ability to detect postpartum depression. In a US study, 391 mothers were assigned to either a postpartum screening group, where the Edinburgh Postnatal Depression Scale (EPDS) was administered, or a control group, which consisted of spontaneous detection via routine clinical examination (Evins, Theofrastous, & Galvin, 2000). As expected, the incidence of depressive symptomatology detection was significantly higher in the screening group than in the spontaneous detection group (35.4% vs. 6.3% respectively; $\underline{p} < 0.001$). Similar findings were found in another US study where women who completed the EPDS were significantly more likely to be identified with postpartum depression symptomatology than those in the routine examination group: 11 of 37 women (30%) versus 0 of 35 women ($\underline{p} < 0.001$) (Fergerson, Jamieson, & Lindsay, 2002); other researchers have found comparable results (Georgiopoulos, Bryan, Wollan, & Yawn, 2001; Hearn et al., 1998). Complementing these empirical findings are interviews with physicians and midwives participating in postpartum depression screening programs, which indicate administering the EPDS not only increases awareness but also promotes appropriate referrals (Schaper, Rooney, Kay, & Silva, 1994). These preceding results suggest that the incorporation of a screening tool into clinical practice can improve health professional responsiveness and may be an effective adjunct to postpartum assessments.

Principles of Screening

Before symptoms are readily identifiable by health professionals, serious diseases or conditions may be present in affected individuals without their knowledge. Screening is the most widely used method for early detection and is defined as the positive identification of unrecognized disease or defect through the application of tests, examinations, or other procedures that can be rapidly applied (Shah, 1998). However, it should be noted that a positive screening result does not always equate to possessing the targeted condition, as screening procedures *are not* diagnostic. Therefore, to ensure clinical utility screening tests are evaluated in terms of their validity, which is established through accurate diagnostic methods and expressed in terms of sensitivity and specificity. Sensitivity refers to the ability of the test to identify correctly individuals who

truly *have* the condition while specificity refers to the ability of the test to identify correctly individuals who *do not have* the condition. Logically, tests with low sensitivity and specificity are considered ineffective screening tools. However, a screening test is never 100% sensitive and specific, as high sensitivity is gained at the expense of specificity and vice versa. Validity is also determined through a positive predictive value, which is the proportion of individuals screened positive by a test that actually have the condition (i.e., the proportion of true positives in all test positives). It is notable that positive predictive values tend to be higher when the condition is more prevalent in the target population. Together, these main psychometric characteristics assist health professionals in determining the clinical utility of a screening tool.

Criteria for a Screening Program

As new screening tests arise, pressures to adopt and institutionalize screening programs emerge. However, according to diverse experts (Cadman, Chambers, Feldman, & Sackett, 1984; Sackett, 1987), including the Joint World Health Organization (WHO)/International Agency for Research on Cancer (IARC) screening program implementation criteria, screening procedures are only justifiable if the following standards are met:

1. Disease Issues
    - 1.1. Conditions/diseases for which screening is used should be important health problems. If there is an extremely low incidence of a condition, the cost and effort of screening may be prohibitive. Understanding the incidence and prevalence of the condition in a population is necessary before embarking on any large-scale screening program.
    - 1.2. The progression of the condition should be understood; if controlled studies have demonstrated that the natural history of the condition is not favourably altered by early detection and management then screening should not be instituted.
    - 1.3. Effective treatment for individuals with the conditions should be available.
2. Screening Test Issues
    - 2.1. Screening tests should have good sensitivity, specificity, and predictive value.
    - 2.2. The screening procedure should be safe, convenient, and acceptable to the target population.
    - 2.3. Screening tests should be cost-effective, easy to interpret, and readily incorporated into practice.
    - 2.4. Screening tests should be accessible to the target population.
3. Health System Issues
    - 3.1. A clearly defined population should be targeted.
    - 3.2. Comparing the costs and efficiency of various screening procedures for a condition is necessary for achieving maximum benefits at minimum cost.

3.3. An analysis of harms and benefits should be conducted. (i.e., overall long-term benefits should be greater than long-term detriment).

3.4. Strategies should be in place to ensure that the screening program will reach those who will benefit the most from the program.

3.5. Policies should stipulate what action should be taken for borderline results in order to avoid over-identifying the condition.

3.6. Standard policies for referral and preventive/treatment options that are accessible and acceptable should be established.

3.7. Facilities for screening/diagnosis and treatment should be available as the lack of follow-up negates the benefit of screening.

3.8. Responsibilities in the screening program should be clear (i.e., who does what and when).

3.9. How the findings will become part of a participant's medical record should be delineated.

3.10. Compliance with an effective care pathway should be ensured otherwise, there is no benefit of screening.

3.11. Screening programs should be an incessant process rather than being conducted once.

3.12. Continuous monitoring and evaluation should be incorporated into the screening program.

3.13. Consumer perspectives should be integrated.

3.14. Screening programs should not be static but amenable to new scientific evidence.

According to the Ontario Task Force on the Use and Provision of Medical Services (1990), other important questions to consider before developing and implementing a screening program include:

1. Are the screening program requirements (i.e., time and cost) appropriate for the community?
2. Are other equally worthy procedures and efforts being given equivalent consideration or are existing resources being redirected unnecessarily?
3. Does the procedure create new medical risks and how are these assessed in relation to the procedure?
4. Does the procedure place additional strain on health care resources in a disproportionate manner to the magnitude of the health problem being studied?
5. What are the limitations of using screening assessments as a widespread diagnostic tool in relation to other diagnostic approaches?
6. Are there specific ethical or moral issues raised by the screening program?

7. How will the objectives of the screening program be communicated to the various target populations at risk?

Measures Used in the Detection of Postpartum Depression

Today, both general and postpartum-specific depression instruments have been utilized to measure depressive symptomatology. The validation of screening tools and the diagnosis of postpartum depression can only be accomplished through the application of *diagnostic criteria* such as the popular and progressively evolving Diagnostic and Statistical Manual [i.e., DSM-III (APA, 1980), DSM-III-R (APA, 1987), or DSM-IV (APA, 1994)] criteria for major depression in addition to the Research Diagnostic Criteria (RDC) (Spitzer, Endicott, & Robins, 1975), and the International Classification of Diseases (ICD-10) (Spitzer et al., 1975; WHO, 1992). Measures used to *assess* depressive symptomatology include standardized interviews, clinician-rated scales, and self-report questionnaires. To provide a clear understanding of the different measures and to promote methodological comparisons between studies, the most common interviews and questionnaires used to assess depressive symptomatology in postpartum depression research are briefly presented.

Standardized Interviews

A number of standardized interviews are available to establish a diagnosis of postpartum depression. These instruments are typically used for research purposes and are based on stringent criteria to ensure a systematic and reliable diagnosis. Their use is restricted to trained clinicians or researchers who have a thorough knowledge of DSM, RDC, or ICD systems of diagnosis and clinical judgement is essential in determining whether the responses provided by participants meet the diagnostic criteria. These instruments are time-consuming, expensive, and not recommended for general clinical practice.

Schedule of Affective Disorders and Schizophrenia (SADS). The SADS consists of open-ended questions concerning each symptom with probes for follow-up questions (Spitzer, Endicott, & Robins, 1978). There are 11 depressive symptoms (seven somatic and four cognitive affective) in the eight categories of appetite disturbance, sleep disturbance, fatigue, loss of interest, guilt, impaired concentration, suicidal ideation, and motor disturbance. The presence and severity of each symptom is rated from 1 to 6 by the interviewer and a symptom must receive a rating of at least 3 (mild) or higher (severe and experienced often) and have been present for a minimum of 2 weeks to be considered clinically significant. The SADS is designed to obtain data to formulate a diagnosis based on RCD, which has operationally defined inclusion and exclusion criteria for each diagnostic category. Administration takes approximately 90 minutes to complete. The SADS has been used in several postpartum depression studies (Areias, Kumar, Barros, & Figueiredo, 1996a; Carothers & Murray, 1990; Whiffen & Gotlib, 1993).

Structured Clinical Interview for DSM-IV-R (SCID). The SCID is a clinical interview that incorporates DSM-IV diagnoses and has different versions for use with psychiatric inpatient, outpatient, and non-clinical populations (Spitzer, Williams, Gibbon, & First, 1992). While it has software suitable for administration and scoring, clinical judgement is an essential component of the interview, which should be conducted by trained health professionals. It is divided into six self-contained modules and takes approximately 45 to 60 minutes to complete. The SCID has been used in a number of recent postpartum depression studies (Lee et al., 1997; Lee, Yip, Chiu, & Chung, 2000; D. Lee et al., 1998; Zelkowitz & Milet, 1995).

Standard Psychiatric Interview (SPI). The SPI (also referred to as the Clinical Interview Schedule; CIS) is a semi-structured interview intended for use in community surveys (Goldberg, 1972). The SPI is shorter than other standardized interviews and consists of questions designed to elicit the presence or absence of 10 defined psychiatric symptoms. The interviewer rates the presence of another 12 manifest abnormalities of mental state. Each symptom receives a score on a 5-point scale of severity and the total score is the sum of 10 symptom ratings added to twice the score of the manifest abnormalities. The interview has often been modified by adding items concerning appetite changes and weight loss to allow RDC to be applied. The SPI has been used postnatally (Boath, Cox, Lewis, Jones, & Pryce, 1999).

Present State Examination (PSE). The PSE is a semi-structured clinical interview that determines whether or not defined psychiatric symptoms have been present in the previous 4 weeks (Wing & Stuart, 1978). The interview results are used to classify cases according to the PSE-Index of Definition-Catego (PSE-ID-Catego). The index specifies the degree of certainty with which a respondent may be considered a case, by using eight levels each of which implies greater confidence in case classification; level 5 is considered the threshold that divides cases from non-cases. The criteria used to determine the presence of symptoms are more stringent than are those in the SPI; hence, the SPI could include lower levels of psychiatric morbidity that would not reach the recommended threshold for the PSE. The PSE has been used in a number of postpartum depression studies (Carpiniello, Pariante, Serri, Costa, & Carta, 1997; Ghubash & Abou-Saleh, 1997)

Clinician-Rated Scales

Various clinician-rated scales are available to assess for depressive symptomatology and monitor treatment response. These measures are used to quantify and standardize clinical judgement and provide ratings of duration and severity; they are not employed for population-based screening. The two measures reported most frequently in postpartum depression literature are the Hamilton Rating Scale for Depression and the Montgomery-Asberg Depression Rating Scale.

Hamilton Rating Scale for Depression (HRSD). The HRSD (also referred to as the Hamilton Depression Rating scale - HDRS) was originally developed to assess the severity of depression among diagnosed patients and was intended as a means of qualifying expert clinical judgement (Hamilton, 1960). The original

HRSD consists of 17 depressive symptoms, eight of which relate to somatic complaints, and other versions are available ranging up to 31 items. Responses are rated on either a 3 or 5-point scale with a total score ranging from 0 to 50; a cut-off score of 15 and above is suggestive of major depression. This scale had been used frequently in the postpartum depression literature (Cohen et al., 2001; O'Hara, Stuart, Gorman, & Wenzel, 2000; Thompson, Harris, Lazarus, & Richards, 1998).

Montgomery-Asberg Depression Rating Scale (MADRS). The MADRS was developed as an observer rating scale and consists of 10 items (Montgomery & Asberg, 1979). The items are primarily concerned with psychological symptoms of depression and include global ratings of disturbance and social functioning. Each item is rated in severity from 0 to 6 with a total score ranging from 0 to 60; scores between 7 and 18 indicate mild depression, although some studies have used a cut-off level of 11. While the MADRS has been used by several postpartum depression researchers, it has been associated with a high false positive rate and scores should be confirmed with more reliable methods (Ahokas, Kaukoranta, Wahlbeck, & Aito, 2001; Harris, Johns et al., 1989; Lawrie, Hofmeyr, De Jager et al., 1998; Wickberg & Hwang, 1996b).

Self-Report Questionnaires

Diverse self-report scales are available to assess depressive symptomatology and measure treatment response. These measures generally have respondents rate depressive symptoms in terms of frequency or severity; however, they cannot be used to obtain a diagnosis and high scores should be followed-up with a more in-depth assessment. Some self-report questionnaires are subject to copyright and are not available for general use (e.g., Beck Depression Inventory).

Edinburgh Postnatal Depression Scale (EPDS). By far the most widely used instrument in postpartum depression studies and for population-based screening is the EPDS, a 10-item self-report scale specifically designed to screen for postpartum depression in community samples (Cox, Holden, & Sagovsky, 1987a). Each item is scored on a 4-point scale (from 0 - 3), with a total score ranging from 0 to 30. The items, written in the past tense, include questions related to maternal feelings during the past 7 days and refer to depressed mood, anhedonia, guilt, anxiety, and suicidal ideation. One advantage of this scale it that it does not include common somatic symptoms such as insomnia and appetite changes, which may occur naturally in postpartum women, but rather only one item addresses a somatic symptom and this relates to mood: I have been so unhappy that I have had difficulty in sleeping. The EPDS is typically administered as a pencil and paper test, although computerized versions are now available; both versions are highly correlated and acceptable to women (Glaze & Cox, 1991).

The original EPDS study was completed with a sample of 84 Edinburgh women previously identified by health professionals as potentially depressed at 6 weeks postpartum (Cox et al., 1987a). EPDS scores were compared with the Research Diagnostic Criteria (RDC) obtained from the Standard Psychiatric Interview (SPI). A threshold of 13 identified all 21 women with a RDC diagnosis of major depression and the

sensitivity, specificity, and positive predictive value were 86%, 78%, and 73% respectively. As such, a cut-off score of 12/13 has been recommended for major postpartum depression symptomatology (Cox et al., 1987a; Murray & Carothers, 1990). However, the EPDS does not provide a measure of severity as women who score over 18 can meet DSM criteria for minor depression while others scoring between 14 to 16 can be classified as experiencing major depression (Holden, 1994). Accordingly, the EPDS is not a substitute for a full clinical evaluation but rather a high score is indicative that further assessment is warranted. It is important to note that the selection of a cut-off score depends upon the assessment purpose. While a 12/13 cut-off is suggestive of major depressive symptomatology, a lower threshold of 9/10 has been recommended for community screening to ensure all potential cases of postpartum depression are identified (Cox, Murray, & Chapman, 1993; Murray & Carothers, 1990; Zelkowitz & Milet, 1995).

As shown in Table 1 where studies are chronologically ordered, the English version of the EPDS has been validated in comparison to several standard psychiatric measures (e.g., SADS, SCID, PSE, and SPI) and is highly correlated with other measures of depression including the BDI (Harris, Huckle, Thomas, Johns, & Fung, 1989), SRDS (Condon & Corkindale, 1997), GHQ (Boyce, Stubbs, & Todd, 1993), HRSD (Harris et al., 1992), and MADRS (Harris, Johns et al., 1989). Furthermore, the instrument has been used in various countries resulting in diverse translations and corresponding validation investigations (Table 1). Not surprising, methodological variations, such as population selection criteria, diagnostic criteria, cut-off values, and study timeframe, have resulted in sensitivity and specificity differences. For example, disparities in diagnosis may be problematic as some measures (e.g., PSE) rate depressive symptomatology in the previous 4 weeks while others (e.g., SPI) rate symptoms in the previous 2 weeks; this latter timescale is closer to the EPDS instructions, improving comparison between the two measures. Murray and Carothers (1990) have suggested that sensitivity and specificity may vary according to participants' ability to identify their psychological status as morbid. They also propose that the EPDS, completed after a semi-structured interview, may not provide the same results as those completed before, as the interview may have sensitised the participant to depressive symptoms that might not have otherwise been acknowledged. Another explanation for the differing sensitivity and specificity is the impact of the reference diagnosis criteria used. For instance, a major depressive diagnosis requires more symptoms to be established in RDC than in DSM. Finally, differences in the positive predictive value are dependent on the prevalence of the condition being examined. Thus, studies with mothers who present clinical symptoms of distress will have a higher prevalence rate and positive predictive value than population-based studies.

These validation studies have also highlighted that scores from translated versions should be interpreted cautiously as different cut-off points have been suggested. For example, Guedeny and Fermanian (1995) concluded in their study that a threshold of 11/12 was appropriate in a French population, giving a sensitivity of 80% and a specificity of 92%. Wickberg and Hwang (1996), validating the EPDS in a Swedish

community sample at 3 weeks postpartum, also suggested an 11/12 cut-off; however, the researchers did not assess the psychometrics using a 9/10 cut-off to provide a true comparison. Ghubask and Abou-Saleh (1999) adopted a threshold score of 11/12 to identify cases of depression among Arabic women when the EPDS was administered at 7 days postpartum and the Present State Examination (PSE) at 8 weeks. Lee et al. (1998) recommended that a cut-off of 9/10 was most appropriate at 6 weeks postpartum in a Chinese population while Okano et al. (1996) reported that a cut-off of 8/9 was suitable for a Japanese population. In an Australian study of Vietnamese and Arabic mothers (Matthey et al., 1997), fewer Vietnamese mothers met the criteria for depression. However, detailed comparisons between EPDS and Diagnostic Interview Schedule (DIS) (Robins, 1989) questions suggested that these lower rates were possibly due to a social desirability bias in terms of verbally reporting negative emotions and a cut-off of 9/10 was suggested for Vietnamese women; similar response patterns were found by Lee at al (1998) in their Hong Kong study. Lee and his colleagues speculated that the traditional supportive rituals of "doing the month" may have postponed the onset of significant depressive symptomatology at 6 weeks postpartum. It is also possible that these Chinese women, like their Vietnamese counterparts, were reluctant to concede unhappiness or distress in the early postpartum period to an interviewer; however, the women seemed less constrained in responding to a self-report questionnaire. In contrast, Yoshida and colleagues (1998) found similar depression rates in Japanese women residing in England and Japan using a clinical interview. However, depression was not detected when the translated EPDS was used as a screening instrument. In particular, a 12/13 cut-off resulted in a sensitivity of zero, rendering the researchers to conclude that Japanese women may be reluctant to disclose depressive symptoms via a self-report measure. They also commented that the difference might be due to the exclusion of somatic symptoms in the EPDS since Japanese women tend to refer to physical problems and concerns about their infant rather than expressing feelings of low mood directly. The preceding results suggest that while an optimal cut-off appears to vary slightly for different cultures, an EPDS score above 9 seems to be the most advantageous threshold if a two-stage screening process (e.g., universal screening where high scoring mothers are contacted further for a more detailed assessment) is implemented to reduce false positive scores.

In addition to widespread usage and sound psychometric properties, the EPDS: (1) is easy to administer, including via telephone (Zelkowitz & Milet, 1995), (2) has uncomplicated interpretation, and (3) can be readily incorporated into routine practice. Furthermore, high maternal acceptance has been reported by numerous researchers (Cox et al., 1987a; Fergerson et al., 2002; Murray & Carothers, 1990; Schaper et al., 1994; Webster et al., 1997; Zelkowitz & Milet, 1995).

Beck Depression Inventory (BDI). As one of the most commonly used general self-report questionnaires with considerable psychometric data, including a 25-year review (Beck, Steer, & Garbin, 1988), the copyrighted BDI is a 21-item scale that assesses affect, cognitive symptoms, behaviours, somatic complaints,

and interpersonal domains to measure the presence and intensity of depressive symptoms (Beck, Rush, & Shaw, 1979). Items inquire about mood over the past 7 days and are rated on a 4-point scale ranging from 0 to 3, with higher scores indicating lower mood. While a cut-off score of 12/13 for screening and 20/21 for clinical research has been recommended and many studies have used a cut-off score of 15/16, other researchers have preferred a range of scores with 0 to 9 indicating no symptomatology, 10 to 20 signifying mild depression, 21 to 30 representing moderate depression, and over 30 suggesting severe depression (Kendall, Hollon, & Beck, 1987). Recently, the instrument has been revised to formulate the symptom content to correspond more closely to the diagnostic criteria of DSM-IV. While the BDI-II is still composed of 21 symptoms, the indicators of weight loss, body image change, work difficulty, and somatic preoccupation were eliminated and replaced with the four new symptoms of agitation, worthlessness, concentration difficulty, and loss of energy (Beck, Steer, Ball, & Ranieri, 1996). The scoring is the same as the original BDI but the time period for the ratings has changed from 1 to 2 weeks. The performance of the BDI-II with postpartum women was recently assessed producing acceptable results (Beck & Gable, 2001a).

Table 2-1. Validation and/or Translation of the Edinburgh Postnatal Depression Scale

Study	Year	Country	Language	N	Time	Diagnostic Criteria	Diagnostic Instrument*	EPDS Cut-off	Sensitivity	Specificity	PPV
(Cox, Holden, & Sagovsky, 1987b)	1987	UK	English	84	6 wks	RDC	SPI	12/13	86	78	73
(Harris, Huckle et al., 1989)	1989	UK	English	147	6 wks	DSM-III	Clinical interview, MADRS, BDI	12/13	95	93	75
(Murray & Cox, 1990)	1990	UK	English	100	Pregnancy	RDC	SPI	12/13	64	90	50
(Carothers & Murray, 1990)	1990	UK	English	646	6 wks	RDC	SPI	9/10	82	89	39
								12/13	96	68	68
(Murray & Carothers, 1990)	1990	UK	English	142	6 wks	RDC	SPI	9/10	89	82	39
								12/13	68	96	67
(Pop, Komproe, & van Son, 1992)	1992	Nether-lands	Dutch	303	4 wks	—	SCL-90, BDI	Correlations with other depression scales			
(Boyce et al., 1993)	1993	Australia	English	103	12 wks	DSM-III-R	DIS, GHQ, Pitt	9/10	100	89.4	47.4
								12/13	100	95.7	69.2
(Jadresic, Araya, & Jara, 1995)	1995	Chile	Spanish	108	8-12 wks	RDC	PAS	9/10	100	80	37
								12/13	55	94	50
(Zelkowitz & Milet, 1995)	1995	Canada	English	89	6-8 wks	DSM-III-R	SCI	9/10	91	76	78
								12/13	67	94	91
(Wickberg & Hwang, 1996b)	1996	Sweden	Swedish	128	8-12 wks	DSM-III-R	MADRS	11/12	96	49	—
(Areias et al., 1996a)	1996	Portugal	Portuguese	54	24 wks	RDC	SADS	9/10	65	96	91
								12/13	29	96	90
(Okano et al., 1998)	1996	Japan	Japanese	—	—	—	—	8/9	75	93	50
(Ghubash, Abou-Saleh, & Daradkeh, 1997)	1997	UAE	Arabic	93	1wk EPDS 8wk PSE	PSE-ID-Catego	PSE	10/11	91	84	44
								12/13	73	90	50
(Guedeney, Fermanian, Guelfi, & Kumar, 2000)	2000	France	French	87	16 wks	RDC	PSE	9/10	84	78	30
								12/13	60	97	78
(Carpiniello et al., 1997)	1997	Italy	Italian	61	4-6 wks	PSE-ID-Catego	PSE	9/10	100	83	50
								12/13	67	100	100
(D. T. Lee et al., 1998)	1998	Hong Kong	Chinese	142	6 wks	DSM-III-R	SCI, GHQ, BDI	9/10	82	86	44
								12/13	41	95	—

Study	Year	Country	Language	N	Time	Diagnostic Criteria	Diagnostic Instrument*	EPDS Cut-off	Sensitivity	Specificity	PPV
(Bergant, Nguyen, Heim, Ulmer, & Dapunt, 1998)	1998	Austria	German	110	4 days	ICD-10	Clinical interview	9/10	96	100	100
(Lawrie, Hofmeyr, de Jager, & Berk, 1998)	1998	South Africa	English	102	6 wks	DSM-IV	Clinical interview, MADRS	9/10	84	57	39
								12/13	76	82	58
(Clifford, Day, Cox, & Werrett, 1999)	1999	UK	Punjabi	98	6-8 wks	–	–	Conceptual and cross-cultural equivalence			
(Benvenuti, Ferrara, Niccolai, Valoriani, & Cox, 1999)	1999	Italy	Italian	113	8-12 wks	DSM-III-R	MINI	9/10	83	90	60
								12/13	56	99	91
(Barnett, Matthey, & Gyaneshwar, 1999)	1999	Australia	English	105	6 wks	DSM-III-R	DIS, GHQ-30, Faces Scale	9/10	100	69	13
								12/13	100	89	29
			Arabic	98				9/10	78	80	29
								12/13	56	91	39
			Vietnamese	113				9/10	86	84	27
								12/13	57	94	40
(Thome, 2000)	2000	Iceland	Icelandic	201	8-12 wks	–	–	Cronbach's alpha 0.80			
(Eberhard-Gran, Eskild, Tambs, Schei, & Opjordsmoen, 2001)	2001	Norway	Norwegian	56	8-12 wks	DSM-IV	PCEMD, MADRS	9/10	100	87	–
(Regmi, Sligl, Carter, Grut, & Seear, 2002)	2002	Nepal	English	100	8-12 wks	DSM-IV	Structured interview	12/13	100	93	42

* SCL-90 – Symptom Checklist-90; PAS-Psychiatric Assessment Schedule; MINI – Mini International Neuropsychiatric Interview; DIS – Diagnostic Interview Schedule; PCEMD – Primary Care Evaluation of Mental Disorders; SCI – Structured Clinical Interview for DSM-III-R

While the BDI's psychometric properties have demonstrated robustness as an instrument, its use as a postpartum depression measure is equivocal (Hopkins, Campbell, & Marcus, 1989; Horowitz, Damato, Solon, Von Metzsch, & Gill, 1995) as several studies have found the instrument to be unsatisfactory as a screening measure (Gotlib, Whiffen, Mount, Milne, & Cordy, 1989; Whiffen, 1988). In particular, the large number of somatic items, which are normal postpartum symptoms, have lead to inflated scores among new mothers (Harris, Huckle et al., 1989; Hopkins et al., 1989; O'Hara, Neunaber, & Zekoski, 1984). Furthermore, in a Dutch population, 12% of mothers expressed difficulty in their ability to complete the BDI (Pop et al., 1992). Despite these cautions, researchers have suggested that the BDI is valuable in studies involving longitudinal designs and measurement of symptom severity (Affonso et al., 2000).

Center for Epidemiological Studies Depression Scale (CES-D). The CES-D consists of 20 items chosen from previously validated depression scales with an emphasis on the affective component of depressed mood (Radloff, 1977). Items inquire about mood in the past 7 days and are rated on a 4-point scale with scores ranging from 0 and 60, with higher scores indicating lower mood. Sixteen items represent negative symptoms such as depressed mood, feelings of guilt, and worthlessness and helplessness, whereas four positively worded items are included to break tendencies and assess positive affect and sense of well-being (Liang, Van Tran, Krause, & Markides, 1989). These four items are reverse coded to indicate lack of well-being. A score of 16 has been used as a standard threshold indicating possible clinical depression (Radloff, 1977; Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). The CES-D has been used in several postpartum depression studies (Campbell & Cohn, 1991; Fleming, Klein, & Corter, 1992; Logsdon, McBride, & Birkimer, 1994) and in a sample of 1,007 primiparous women, the CES-D had a sensitivity of 60% and a specificity of 92% (Campbell & Cohn, 1991).

Depression Adjective Checklist (DACL). The DACL has seven equivalent checklists to minimise test-retest effects and all contain either 32 or 34 adjective choices (Lubin, 1981; Lubin, Nathan, & Nathan, 1981). Negative (e.g., weary or low spirited) and positive (e.g., joyous or enthusiastic) adjectives are listed and respondents check all the words that describe how they feel 'now-today.' Most items are expressed in terms of affect rendering the DACL to be regarded more a measure of depressed mood than indicative of a depressive syndrome. Scores range from 0 to 32 or 34, depending on the form used, with higher scores indicating increased depressed affect. Limitations of this scale include its failure to evaluate duration or severity of dysphoria and that it has not been specifically validated with pregnant or postpartum women. As such, it is seldom used in postpartum depression studies (Da Costa, Larouche, Dritsa, & Brender, 2000; Gennaro, 1988; Horowitz, Damato, Solon, & von Metzsch, 1996; Pop et al., 1992).

General Health Questionnaire (GHQ). The GHQ covers a broad range of symptoms related to psychiatric disorders among a general population and is divided into four subscales: Somatic, Anxiety and Insomnia, Social Dysfunction, and Severe Depression (Goldberg & Hillier, 1979). Each item is rated on a 4-point

Likert-type format ranging from 0 (absent) to 3 (intense). There are several versions of the GHQ each containing different numbers of items ranging from 60 (GHQ-60) to 12 (GHQ-12) items. While the GHQ has been used in several postpartum depression studies (Boyce et al., 1993; Guedeney & Fermanian, 1998; D. Lee et al., 1998; Matthey et al., 1997), new mothers frequently have inflated scores. For example, in an Australian study of 103 postpartum women, 25% scored over 4, the standard cut-off point (Boyce et al., 1993). Using a slightly modified version of the GHQ-30 (removing two questions pertaining to disturbed sleep and getting out of the house) and raising the cut-off to over 6 improved the GHQ as a measure of postpartum depression (Brugha et al., 1998).

Hospital Anxiety and Depression Scale (HADS). The HADS is 14-item scale that contains seven items pertaining to depressed mood (HADS-D) (Zigmond & Snaith, 1983). Scores range between 0 and 21 and although it includes one item relating to feeling 'slowed down,' it otherwise excludes neurovegetative changes. While data about sensitivity and specificity is not provided, a cut-off score of 11 has been equated with depressive symptomatology and the scale has been used in several postpartum depression studies (Condon & Corkindale, 1997; Thompson et al., 1998). However, in a study of 755 women, the HADS-D had a sensitivity of 65% and specificity of 90% resulting in the researchers suggesting that a lower cut-off of 8/9 should be employed in postpartum samples (Harris et al., 1992); similar results were found by others (Thompson et al., 1998).

Profile of Mood States (POMS). The POMS is a 65-item, adjective-rating scale designed to measure subjective mood states where respondents are presented with a list of feelings and requested to reply to the question "How have you been feeling during the past week including today?" (McNair, Loot, & Droppleman, 1981). Each question is rated on a 5-point Likert-type scale ranging from 0 (not at all) to 4 (extremely) with a total score obtained by summing the 58 items on the following factors: Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigour (reverse scored), Fatigue, and Confusion; the remaining seven items are included as buffers. The depression subscale (POMS-D) contains 15 items, including somatic ones. Recommended cut-off scores have not been established although higher scores indicate increased mood disturbance. While it has not been widely used in the general depression literature, it has been incorporated in a number of studies with postpartum women (Condon & Corkindale, 1997; Fisher, Feekery, & Rowe-Murray, 2002; Hayes, Muller, & Bradley, 2001; Meager & Milgrom, 1996).

Pitt Depression Scale. The Pitt Depression Scale is a 24-item questionnaire designed as a screening instrument to measure maternal anxiety and depression before and after childbirth (Pitt, 1968). The items are listed as questions and the respondent indicates whether each symptom was present 'today, or over the past few days' and are given a choice of responding yes, no, or don't know; total scores range from 0 to 48. This scale has been used infrequently with postpartum women (Boyce et al., 1993; Wolman, Chalmers, Hofmeyr, & Nikodem, 1993).

Postpartum Depression Screening Scale (PDSS). The PDSS is a 35-item Likert-type response scale consisting of seven dimensions, each of which contains five items; the dimensions include sleeping/eating disturbances, anxiety/insecurity, emotional lability, cognitive impairment, loss of self, guilt/shame, and contemplating harming oneself (Beck & Gable, 2000, 2001b). The conceptual basis of the PDSS is based on a series of qualitative postpartum depression studies (Beck, 1992, 1993, 1996). Each item describes how a woman may be feeling after the birth of her baby and respondents are asked to indicate their degree of disagreement or agreement on a 5-point scale regarding how they have felt over the past 2 weeks. Initial psychometric testing involved 525 mothers at approximately 6 weeks postpartum. In a further methodological study, 150 mothers within 12 weeks postpartum completed in random order three questionnaires: PDSS, EPDS, and the Beck Depression Inventory II (BDI-II). The PDSS was strongly correlated with both the BDI-II ($r = 0.81$) and EPDS ($r = 0.79$). Using Receiver Operating Characteristic (ROC) curves, a PDSS cut-off score of 80 (sensitivity 94% and specificity 98%) was recommended for major postpartum depression and a cut-off score of 60 (sensitivity 91% and specificity 72%) for major or minor postpartum depression.

Zung Self-Rating Depression Scale (ZSDS). The ZSDS is a widely used and extensively validated self-report instrument containing 20 items: three affect items, six cognitive items, four overt-motor behaviour items, six somatic items, and one social-interpersonal item (Zung, Richards, & Short, 1965). Respondents rate each item according to how they felt during the preceding week with item responses ranked from 1 to 4, with higher numbers corresponding to more frequent symptoms (although several items are scored in reverse). The sum of the 20 items produces a raw score that is converted into a percentage of the depression measurable by the scale (termed the "SDS Index"). Index scores are then categorized into 4 levels to offer a global clinical impression, as recommended by the instrument developers: I, within normal range, no significant psychopathology (SDS Index: <50); II, presence of minimal to mild depression (SDS Index: 50 - 59); III, presence of moderate to marked depression (SDS Index: 60 - 69); and IV, presence of severe to extreme depression (SDS $\geq$ 70). While the ZSDS has been used in diverse postpartum depression studies in a variety of countries (Augusto, Kumar, Calheiros, Matos, & Figueiredo, 1996; Condon & Corkindale, 1997; Kitamura, Shima, Sugawara, & Toda, 1994; Viinamaki, Niskanen, Pesonen, & Saarikoski, 1997), limitations such as length and copyright limit feasibility.

Comparisons between Screening Instruments

It has been suggested that the measurement of 'depression' is as confused as the basic construct itself. Other researchers have summarized the inherent difficulties of assessing the presence and/or severity of psychiatric syndromes from rating scales based on symptoms (Snaith, 1993). Aside from the problems of agreeing upon an appropriate cut-off score for diagnostic caseness, there is the more fundamental difficulty of a lack of agreement regarding the definition of depression. If a construct such as 'depression' is defined

very narrowly, items contained in a scale to measure it will tend to be homogeneous and may paraphrase each other. Such an instrument will have high internal consistency but may lack validity. In contrast, if depression is defined too broadly, then quite different symptom profiles could achieve similar scores. As a result, diagnostic caseness may be achieved by disparate groups of individuals. The problem is how much heterogeneity is acceptable if the construct depression is to remain useful and meaningful (Condon & Corkindale, 1997). The weight of available evidence supports the notion that depression is heterogeneous; therefore, the validity of a particular questionnaire score may be debatable if the instrument is used in populations different from the one with which it was developed. It has also been claimed that the fundamental lack of agreement regarding the definition of depression and appropriate cut-off scores for diagnosis result in low levels of concurrent validity between different measurements (Condon & Corkindale, 1997).

Diversity and inconsistency in assessment procedures for postpartum depression have hampered the meaningful comparison of studies and compromised the development of a cumulative body of knowledge. The lack of consensus regarding the definition of postpartum depression has resulted in different types of assessment instruments, variable cut-off scores, and diverse times in which assessments are conducted. In order to attain standardization, systematic scrutiny regarding the advantages and disadvantages of assessment methods used is required. For example, self-report measures have the advantage of being relatively inexpensive and easy to use. Furthermore, administration of these measures requires little time or previous training, which permits wider use than clinician-rated scales or standardized interviews. However, self-report measures do not incorporate the benefit of clinical judgement in the weighing of symptoms or enquiry about the context of symptoms such as sleep disturbances.

Despite these conceptual and methodological issues, several researchers have conducted comparisons between diverse self-report measures to determine which instrument is the most effective in identifying postpartum mothers with depressive symptomatology. In a UK study, 147 mothers were screened for major depression at 6 to 8 weeks postpartum. Using predetermined cut-off points, the EPDS and BDI were compared in their abilities to identify the 15% of mothers who were diagnosed with major depression according to DSM-III criteria (Harris, Huckle et al., 1989). The sensitivity of the EPDS was 95% and its specificity 93%. The performance of the Beck Depression Inventory (BDI) was markedly inferior, with a sensitivity of 68% and specificity of 88%. Similarly, the results of a study looking into the association between thyroid status and postpartum depression were reanalysed to explore the psychometric properties of the rating scales employed (Thompson et al., 1998). The performance of the EPDS was found to be superior to that of the Hospital Anxiety and Depression Scale (HADS) in identifying RDC-defined depression and on par with the observer-rated Hamilton Rating Scale for Depression (HRSD). In an Australian study, 200 mothers completed questionnaires at 4, 18, and 32 weeks postpartum to ascertain the degree of agreement

between four self-report depression scales, with particular emphasis on whether each scale would identify the same subgroup of women as being 'most depressed' (Condon & Corkindale, 1997). The four instruments included were the EPDS, the depression subscale of the Hospital Anxiety Depression Scale, the Zung Self-Rating Depression Scale, and the depression subscale of the Profile of Mood States. Agreement between pairs of instruments, in terms of identifying the most depressed subgroup of women in the cohort, averaged approximately 40%; agreement between the three instruments was only about 25%. This poor level of agreement most likely reflects the different emphasis in item content of the questionnaires, which in turn clearly signals the distinct notions of 'depression' held by the instrument developers.

To compare the performance of the newly created Postpartum Depression Screening Scale (PDSS) with the EPDS and Beck Depression Inventory-II (BDI-II), 150 US women completed these instruments in random order, followed immediately by a DSM-IV diagnostic interview (Beck & Gable, 2001a). Of the 150 participants, 18 (12%) were diagnosed with major postpartum depression, 28 (19%) with minor postpartum depression, and 104 (69%) with no depression. The areas under each of the instrument's Receiver Operator Characteristic (ROC) curves were compared to determine significant discrepancies. A ROC curve is constructed by plotting the sensitivity (i.e., true-positive rate) against the false positive rate (i.e., rate at which an instrument falsely indicates the presence of postpartum depression in non-depressed mothers) over a range of cut-off scores (Fletcher, Fletcher, & Wagner, 1996). The overall accuracy of an instrument can be described as the area under the ROC curve. The larger the area is under the curve (AUC), the better the classification ability of the instrument. Compared to the EPDS, the PDSS had a significantly larger area under the ROC curve when screening for major or minor postpartum depression. When using published recommended cut-off scores for major depression, the PDSS achieved the highest combination of sensitivity (94%) and specificity (98%). When detecting women with major or minor postpartum depression, the PDSS again yielded the highest combination of sensitivity (91%) and specificity (72%) of the three instruments. The PDSS identified 17 (94%) of the women diagnosed with major postpartum depression, the EPDS identified 14 women (78%), and the BDI-II identified 10 women (56%). These results are promising and further research with the PDSS is warranted, however its cost and length are barriers to wider use.

In another psychometric study, Chinese women completed the General Health Questionnaire (GHQ), Beck Depression Inventory (BDI), and EPDS at 6 weeks postpartum and were then assessed using the Structured Clinical Interview for DSM-III-R (SCID) (Lee, Yip, Chiu, Leung, & Chung, 2001). The psychometric performance of the GHQ, BDI, and EPDS in detecting postpartum depression was assessed using the Receiver Operating Characteristic (ROC) curves. Both the Chinese GHQ and BDI had satisfactory sensitivity and positive predictive value in detecting postpartum depression and the ROC curves were comparable to that of the EPDS. While the GHQ and BDI may be useful for detecting postpartum depression

among recently delivered Chinese women, the study was conducted using the translated versions of the rating scales, limiting generalizability to English speaking populations.

Finally, to determine whether applying two complementary rating scales of depression symptomatology as a double test would significantly enhance the positive predictive value of postpartum depression screening, 145 Chinese women completed the EPDS and 12-item General Health Questionnaire (GHQ) at 6 weeks postpartum; clinical interviews were then completed to validate postpartum depression diagnoses (Lee et al., 2000). The positive predictive value of the EPDS and GHQ, when administered independently, was 44% and 52%, respectively, for probable major postpartum depression. When the EPDS-GHQ double test was administered, the positive predictive value was increased significantly to 78%. This preliminary finding suggests that simultaneous administration of the EPDS and GHQ may improve identification of women with postpartum depression, potentially enhancing the overall effectiveness of population-wide screening.

Antenatal Screening

While determining the most appropriate instrument to detect postpartum depression is exigent, immense efforts have also been undertaken to identify pregnant women who are at-risk of developing postpartum depression such that secondary preventive interventions may be implemented (Table 2-2). One of the earliest studies to design a simple and practical instrument to detect high-risk women was conducted in Canada (Braverman & Roux, 1978). Randomly selected women (N = 120) attending a Montreal-based prenatal clinic were requested to complete a 19-item "yes/no" questionnaire. Each mother was classified for presence or absence of “postpartum emotional disorder” (PED), according to clearly defined criteria. The responses of mothers classified as having emotional disorders (13%) were compared to the "normal" group with 6 items showing predictive value: (1) feeling unloved by husband, (2) feeling the pregnancy was undesired, (3) past history of postpartum depression, (4) being single or separated, (5) marital problems, and (6) unplanned pregnancy. Following this pioneering work, 17 studies have been found assessing the performance of antenatal questionnaires in predicting postpartum depression (Table 2-1). Chronologically, the Leverton Questionnaire was derived from five factors associated with postpartum depression including past psychiatric history, maternal anxiety, dissatisfaction with marital relationship, lacking a confidante, and previous history of postpartum depression (Leverton & Elliott, 1988). Also included were items pertaining to socio-demographic variables, feelings about pregnancy, previous obstetric and gynaecological history, current stressors, and depression and somatic items from the Crown Crisp Experimental Index (Crown & Crisp, 1979). The questionnaire was validated with 188 pregnant UK women having their first or second child with 99 (53%) being identified as “more vulnerable” for postpartum depression. Fifty of these women were then compared with “less vulnerable” women (n = 89) at 12 weeks postpartum using a detailed interview, including the Present State Examination (PSE). In the vulnerable group, 20 (40%) women were identified with definite/borderline postpartum depression in comparison to only 14 (16%) women without vulnerable

factors. However, the questionnaire identified over half of the sample as vulnerable suggesting a low specificity and positive predictive value.

In a sample of 192 financially impoverished, inner-city women, clinical depression was assessed twice antenatally and once postnatally (Hobfoll, Ritter, Lavin, Hulsizer, & Cameron, 1995). Using the Schedule for Affective Disorders and Schizophrenia (SADS) clinical interview and after controlling for pregnancy-related somatic symptoms, 27.6% of women were identified as depressed at the first antenatal interview, decreasing to 24.5% at the second assessment. Postpartum depression was found among 23.4% of women, a rate significantly higher than those found in middle-class samples. A particularly salient risk factor for antepartum depression was single status while depression rates did not differ between African American and European American women. It is noteworthy that antepartum depression was a weak risk factor for postpartum depression.

In another UK study, a 10-item screening questionnaire was constructed from previous reports of postpartum depression risk factors (Appleby, Gregoire, Platz, Prince, & Kumar, 1994). The predictive ability of the tool was tested among 165 women attending an antenatal clinic at 36 weeks gestation who were then assessed for postpartum depression using the EPDS at 8 weeks postpartum. One hundred and twenty-six (77%) mothers returned the EPDS, 13% of whom had a score above 11. Neither the Antenatal Screening Questionnaire as a whole, nor groups of items, was able to discriminate well between women who later developed depressive symptomatology and the predictive ability of the questionnaire accounted for only 6% of the variance in EPDS scores. Although the antenatal questionnaire scores weakly correlated with postpartum EPDS scores, this was largely because the questionnaire was able to identify correctly those who *would not* become depressed.

In a study comparing correlates of paternal and maternal depression, 54 Portuguese primiparous mothers attending obstetric services participated in a longitudinal study of their mental health (Areias, Kumar, Barros, & Figueiredo, 1996b). All mothers were given a semi-structured clinical interview (SADS) at 24 weeks antenatally and 52 weeks postnatally and sub-samples were interviewed at 12 weeks postpartum. At these time periods, mothers also completed a translated version of the EPDS. Aside from a history of depression, the only other significant predictor of postpartum depression was negative life events.

Based on the Leverton Questionnaire (Leverton & Elliott, 1988), the Modified Antenatal Screening Questionnaire (MASQ) was developed to identify women vulnerable to become depressed after childbirth (Stamp, Williams, & Crowther, 1996). Two hundred and forty nine Australian women at 24 weeks gestation or less completed the screening questionnaire of which 144 (58%) screened more vulnerable; at 6 weeks postpartum, participants completed the EPDS. No difference was found at 6 weeks postpartum between the vulnerable group (return rate 64/68) and the less vulnerable group (return rate 44/51) in the frequency of those who screened as high-risk for postpartum depression. For probable major postpartum depression

(EPDS score above 12), the MASQ's sensitivity was 73%, specificity 43%, positive predictive value 17%, and negative predictive value 91%; for probable minor postpartum depression (EPDS score above 9), the psychometric statistics were 81, 48, 34, and 89%, respectively. Regrettably, the questionnaire identified a high proportion of pregnant women as high risk, increasing even further the false positive rate.

In a sample of over 6000 UK women recruited in the last trimester of pregnancy, a 40-item self-report questionnaire designed to detect risk factors for postpartum depression was administered and maternal mood was assessed at 6 to 8 weeks postpartum using the EPDS (Cooper, Murray, Hooper, & West, 1996). A total of 5,124 (86%) women completed the EPDS at 5 to 6 weeks of which 1,629 scored above 8 and 1,459 (90%) were contacted again by telephone to assess depressed mood and anhedonia. If both factors were not denied, women were interviewed at home with the SCID to establish DSM-III-R diagnosis of major depression. Through a series of logistic regressions on two-thirds of this sample, the original set of variables was reduced to a predictive index of 17 items with weighted scores calculated for each. This index was then applied to the remaining one-third of the sample as a validating procedure and specificity and sensitivity was calculated. The overall rate of major postpartum depression was 15.3%. To determine the predictive performance of the index, they assumed that at a base postpartum depression rate of 10% to 15%, a score of 35 or more resulted in a 40% risk of developing depression; however, 95% of those who were to become depressed scored below 35 on the index. At a score of 27 or more, the risk of postpartum depression was 35% with more than a third of those who were to become depressed scoring in this range. While the researchers recommended the clinical use of the index and the study was well designed with a large sample size, the poor predictive power does not support the utility assertions. It is noteworthy that the researchers suggested that the predictive performance would be significantly improved if maternity blues and infant factors were included.

In another study to develop an antenatal questionnaire, demographic and clinical data, based on previously identified variables, were obtained from 106 pregnant women in their second-trimester (sample I) (Posner, Unterman, Williams, & Williams, 1997). The Beck Depression Inventory (BDI) was then administered at 1, 6, and 12 weeks postpartum. Statistical analysis, including stepwise linear regression, identified a subset of 24 predictive variables. This Antepartum Questionnaire (APQ) was validated retrospectively in the original sample and prospectively in a second group of 99 women (sample II). In both samples, the APQ had acceptable sensitivity (80-82%) and specificity (78-82%). The incidence of postpartum depressive symptoms rose from 10% to 17% by 6 weeks without an appreciable decline at 12 weeks (15%). The percentage of women with more than mild depressive symptoms increased from 30% at 1 week to 47% at 12 weeks. However, the high number of women identified as high-risk and the low positive predictive value suggests the APQ also has limited clinical utility.

In a study designed to assess the prevalence and incidence of postpartum depression, a random sample of 288 Israeli-born and immigrant women were assessed for depressive symptoms at 26 weeks gestation

using the Beck Depression Inventory (BDI) and at 6 weeks postpartum using the EPDS (Glasser et al., 1998). While the two-thirds of the cohort scored as 'depressed' antenatally, one-third of the mothers identified with postpartum depression were new cases. Immigrant status was the only significant predictor of postpartum depression, with Russian new immigrants having over twice the risk for postpartum depression as Israeli-born mothers.

In a prospective cohort study conducted in Zimbabwe, 500 women in the eighth month of pregnancy identified by traditional birth attendants and primary care clinics completed the Shona Symptom Questionnaire (SSQ), a 14-item indigenous psychiatric questionnaire based on local idioms focusing on cognitive symptoms (Nhiwatiwa, Patel, & Acuda, 1998). A "high-risk" cohort consisted of all women who scored above 7 on the questionnaire ($\underline{n} = 95$) and a "low-risk" cohort of 105 women was randomly selected from the remainder of the sample; a modified Clinical Interview Schedule (CIS) was completed by all participants at 6 to 8 weeks postpartum with a score of 14 or more indicating psychiatric caseness. In this study, the overall prevalence of postpartum 'mental illness' was 16%. Of the 95 high-risk women, 44 (46%) scored above 13 on the CIS in comparison to only 10 (9%) of the low-risk mothers. The odds ratios for high-risk women to become mentally unwell in the postpartum period was 10.6 (95% $\underline{CI} = 4.8 - 23.9$, $\underline{p} < 0.001$) after adjusting for age, marital status, and occupation. The most serious study limitation was that a categorical approach was not used in classifying postpartum mental disorders into various types. Even though the researchers suggested that depressive symptoms were the most common clinical presentation among women classified with a "postpartum mental disorder," it is unknown how many women were actually experiencing postpartum depression.

In a pilot trial, pregnant Australian women between 12 and 24 weeks gestation were screened for postpartum depression risk factors based on a researcher-developed 'risk factor scale' (Buist, Westley, & Hill, 1999). Risk factors were selected from a literature review with women scoring above 7 identified as 'at-risk;' a score on this scale reflected a mix of three or more risk factors related to personal/family history of depression, premenstrual syndrome, and marital/childhood difficulties. While 23% of all screened mothers ($\underline{N} = 348$) were identified as high-risk, no sensitivity or specificity results were reported and no mother recruited to participate in the preceding pilot trial ($\underline{N} = 44$) had an EPDS score above 12 at any point in time, providing little support for the screening tool.

In another controlled trial to evaluate the effect of an antenatal intervention to prevent postpartum depression (Brugha et al., 2000), 1300 primiparous UK women were screened using a "Pregnancy and You" questionnaire; the presence of one of the six depression items from the modified General Health Questionnaire resulted in a positive screen. Thirty-one percent of women screened positive and while limited data is available on the screening properties, the low predictive value is evident (Lumley & Austin, 2001).

In a similar trial evaluating a preventive intervention (Elliott et al., 2000), UK women expecting their first or second child completed the Leverton Questionnaire (Leverton & Elliott, 1988) and the depression, anxiety, and somatic subscales of the Crown Crisp Experiential Index (CCEI) (Crown & Crisp, 1979); two questions from a Canadian questionnaire (Braverman & Roux, 1978) were also included. Vulnerability items were constructed to represent four factors: (1) dissatisfaction with partner, (2) previous psychiatric history, (3) lacking a confidante, and (4) high antenatal anxiety. Women were classified as vulnerable if they scored 2 on the Leverton Questionnaire, or scored 1 on more than one question. Women who scored 10 or higher on the CCEI or had a previous history of feeling tense or depressed after childbirth were also considered vulnerable. Obviously, this screening tool is neither simple nor clinically practical and the 38% positive predictive value led the researchers to comment, "It seems unlikely that an antenatal screening questionnaire for postnatal depression could be produced with sufficient predictive power to be clinically useful."

In a population-based study designed to test the predictive power of demographic, obstetric, and psychosocial risk factors related to postpartum depression, 6790 Danish women who attended an antenatal clinic were recruited with 5252 (78%) completing all questionnaires (Forman, Videbech, Hedegaard, Salvig, & Secher, 2000). The validation population was comprised of a separate sample of 528 women enrolled immediately before and after the study period. While more than a third of all pregnant women were identified as being at high risk, only 5.5% of the women scored above 12 on the EPDS. While the sensitivity was high, one in five women who developed depressive symptomatology were missed antenatally and only 12% of mothers identified as high risk went on to develop postpartum depression. Even though this study was well conducted and the tool was validated with a separate sample, the unexplainably low postpartum depression prevalence rate resulted in a low positive predictive power limiting clinical utility.

In a prospective longitudinal study conducted in the UK, 417 pregnant women completed the EPDS antenatally and at 12 weeks postpartum (Johanson, Chapman, Murray, Johnson, & Cox, 2000). Using an unusually high cut-off score (above 14), 41 (9.8%) women during pregnancy and 31 (7.4%) at 12 weeks postpartum were identified with depressive symptomatology. While there was a significant association between antenatal and postpartum depressive symptomatology, only seven (22.6%) of the 31 women who were depressed postnatally had also been depressed antenatally. The unacceptably low sensitivity and predictive power suggests the EPDS is also a poor antenatal screening tool.

In an Australian study of 2118 pregnant women, 901 women (600 with and 301 without antenatal risk factors for postpartum depression) were recruited and administered an antenatal screening tool with 574 (86.4%) returning a postpartum EPDS at 16 weeks (Webster, Linnane, Dibley, & Pritchard, 2000). While more women (25.9%) with an antenatal risk factor scored above 12 on the EPDS than those without any risk factor (10.9%) ($\underline{p} < 0.001$), 40% of women who scored 3 or more on the "Postnatal Depression Risk Index" experienced postpartum depression representing only 27% of all women scoring over 12 on the EPDS at 16

weeks postpartum. Using a cut-off score of 2 on the questionnaire increased the proportion of depressed women correctly identified to 44%; however, the risk of postpartum depression among women who scored in this range fell to 32% (positive predictive value). While the researchers suggest their screening process was effective, their results suggest otherwise.

To examine the prevalence of depressive symptoms and determine whether there is an association between antenatal and postnatal depressive symptomatology, a longitudinal study of 1,558 pregnant Swedish women was conducted (Josefsson, Berg, Nordin, & Sydsjo, 2001). The presence of depressive symptoms was measured using EPDS on four occasions: 35 to 36 weeks gestation, immediately post-delivery, 6 to 8 weeks postpartum, and 24 weeks postpartum; respective prevalence rates were 17, 18, 13, and 13%. While a correlation between antenatal and postnatal depressive symptoms was found ($\underline{r} = 0.50$, $\underline{p}<0.0001$), the positive predictive value was only 33%.

In another postpartum depression preventive trial, 135 pregnant women receiving public assistance were screened for at least one risk factor for postpartum depression; 67% of women screened at risk resulting in 37 women being randomly assigned to either a four-session interpersonal psychotherapy group intervention or to a treatment-as-usual condition (Zlotnick, Johnson, Miller, Pearlstein, & Howard, 2001). Based on structured diagnostic interviews administered at 12 weeks postpartum to assess for postpartum depression, the researcher-developed screening questionnaire had a positive predictive value of only 33%.

Finally, based on the results of an updated meta-analysis, the Postpartum Depression Predictors Inventory (PDPI) consists of 13 risk factors related to postpartum depression (Beck, 1998, 2002b). While the researcher suggests this checklist could be completed antenatally and postnatally to update a woman's risk status, further research is warranted to determine sensitivity and specificity such that the clinical utility may be examined.

Recently, an excellent systematic review (Austin & Lumley, 2003) that summarized these preceding antenatal screening studies was published near the completion of this chapter. Sixteen studies that provided sufficient data for the researchers to calculate specific screening properties were identified; studies that were included in Table 2-2 due to this systematic review are specifically acknowledged. The aim of the reviewed studies were either to: (1) describe the development of a screening tool, (2) assess the continuity of maternal mood across the perinatal period, (3) examine risk factors and depression after birth, or (4) identify high-risk mothers to participate in a prevention trial. Outcome assessments included the EPDS and/or standardized diagnostic psychiatric interviews. No screening instrument met Austin and Lumley's (2003) outlined criteria for routine application in the antenatal period. In summary, the unacceptably low positive predictive values in all these studies make it difficult to recommend the use of screening tools in routine antenatal care.

Table 2-2. Antenatal Screening Studies

Study	Country	N	Screening Measure	Sensitivity	Specificity	PPV	% Identified as High-Risk
(Leverton & Elliott, 1988)	UK	188	Leverton Questionnaire	–	–	–	53
(Appleby et al., 1994)	UK	165	Antenatal Screening Questionnaire	Correlation with antenatal EPDS = 0.34 Correlation with postpartum EPDS = 0.24			13
(Hobfoll et al., 1995)*	US	252	Schedule for Affective Disorders and Schizophrenia	53	62	30	42
(Areias et al., 1996b)	Portugal	54	EPDS	29	89	56	17
(Cooper et al., 1996)	UK	6091	Predictive Index	35	87	35	16
(Stamp et al., 1996)	Australia	248	Modified Antenatal Screening Questionnaire	73	43	17	58
(Posner et al., 1997)	US	106	Antepartum Questionnaire	82	78	30	28
		99		80	82	44	27
(Glasser et al., 1998)*	Israel	344	Beck Depression Inventory	68	74	44	35
(Nhiwatiwa et al., 1998)	Zimbabwe	500	Shona Symptom Questionnaire	82	66	46	19
(Buist et al., 1999)	Australia	348	Risk Factor Scale	–	–	0	25
(Brugha et al., 2000)	UK	1300	–	–	–	19	31
(Elliott et al., 2000)	UK	999	Vulnerability Index	57	75	38	33
(Forman et al., 2000)*	Denmark	6790	–	79	68	12	35
(Johanson et al., 2000)*	UK	509	EPDS	23	91	17	10
(Webster et al., 2000)*	Australia	2118	Postnatal Depression Risk Index	29	89	32	14
(Josefsson et al., 2001)*	Sweden	1558	EPDS	45	86	33	18
(Zlotnick et al., 2001)	US	37	–	–	–	33	67

* Calculations are based on Austin and Lumley (2003)

Screening in the Immediate Postpartum

While it has been recognized that screening for postpartum depression may be beneficial in identifying depressed mothers, the actual timing of screening procedures determines whether the intervention provided takes a secondary preventive or treatment focus. Although terminology and definitions of mood disturbances in the early postpartum period has yet to be clarified and specific criteria for maternity blues has not been well established, the predictive power of maternal mood in the immediate postpartum period (e.g., first 2 weeks postpartum) has consistently been reported to be related to postpartum depression (Beck, Reynolds, & Rutowski, 1992; Fossey, Papiernik, & Bydlowski, 1997; Hapgood, Elkind, & Wright, 1988; Yoshida, Marks et al., 1997). For example, the EPDS was used to measure depressive symptomatology in 217 UK mothers at 5 days and 6 weeks postpartum (Hannah, Adams, Lee, Glover, & Sandler, 1992). A significant positive correlation between the two EPDS scores was found ($\underline{r} = 0.60$, $\underline{p} < 0.001$) and of the 25 women who scored above 12 on the EPDS at 6 weeks, 17 (68%) had similar symptomatology in the first week postpartum (5-day EPDS score above 9). In addition, mothers scoring above 9 on the EPDS at 5 days were 8 times more likely to score above 9 at 6 weeks than those scoring below 10; a previous history of postpartum depression and an EPDS score above 12 at 5 days postpartum increased the risk of postpartum depression at 6 weeks 85-fold.

In a similar but smaller study ($\underline{N} = 88$), Japanese mothers scoring above 9 on the EPDS at 5 days postpartum were 20 times more likely to be diagnosed with postpartum depression during the first 12 weeks postpartum using the Schedule for Affective Disorder and Schizophrenia (SADS)/Research Diagnostic Criteria (RDC)(Yamashita, Yoshida, Nakano, & Tashiro, 2000). Predictors of mood disturbances at 3 days and 6 weeks postpartum were also assessed in 242 Irish mothers (Lane et al., 1997). Eleven percent of mothers ($\underline{n} = 24$) had EPDS scores above 12 at 3 days and at 6 weeks postpartum. While factors associated with a high EPDS score at 6 weeks postpartum included single status, unemployment, unplanned pregnancy, public status, and bottle-feeding, the strongest predictor was maternal EPDS score at 3 days.

In a population-based sample of 594 Canadian mothers who completed the EPDS at 1, 4, and 8 weeks postpartum, the 1-week EPDS was significantly correlated to the 4-week ($\underline{r} = 0.72$, $\underline{p} < 0.001$) and 8-week ($\underline{r} = 0.65$, $\underline{p} < 0.001$) EPDS; a strong relationship between maternal EPDS scores at 4 and 8 weeks was also noted ($\underline{r} = 0.72$, $\underline{p} < 0.001$)(Dennis, in press-a). Using the cut-off score of 9/10, the 1-week EPDS accurately classified 457 (85.4%) mothers at 4 weeks and 410 (82.5%) mothers at 8 weeks with or without minor/major postpartum depression symptomatology; the 1-week EPDS failed to identify 3 (6%) mothers at 4 weeks and 6 (15.7%) mothers at 8 weeks who exhibited major postpartum depression symptomatology. In comparison, using a cut-off of 12/13, the 1-week EPDS accurately classified 464 (86.7%) mothers at 4 weeks and 424 (85.3%) at 8 weeks with or without major postpartum depression symptomatology. However, the 1-week EPDS failed to detect 21 (42.9%) mothers at 4 weeks and 20 (52.6%) mothers at 8 weeks who exhibited major postpartum depression symptomatology. Mothers with a 1-week EPDS score above 9 were 30.3 times

more likely at 4 weeks (95% CI = 17.5 - 42.3) and 19.1 times more likely at 8 weeks (95% CI = 11.0 - 32.9) to exhibit postpartum depression symptomatology. Using a 1-week EPDS score above 12, mothers were 11.6 times more likely at 4 weeks (95% CI = 6.1 - 21.9) and 6.9 times more likely at 8 weeks (95% CI = 3.4 - 13.8) to exhibit major postpartum depression symptomatology. In a recent meta-analysis of 85 studies (Beck, 2002a), "maternity blues" was a significant predictive factor of postpartum depression, further confirming these preceding studies that maternal mood in the immediate postpartum period is a salient factor that warrants further investigation.

Implications for Practice, Policy, and Research

While postpartum depression is moderately prevalent with 13% of new mothers experiencing this condition (O'Hara & Swain, 1996), rates including subsyndromal cases (i.e., depression that is not severe enough to meet DSM-IV criteria but still causes considerable disability) are substantially higher (Dennis, in press-a). This is clinically notable as poorer infant-mother interactions have been reported in cases of mothers with elevated depressive symptoms but whose depression was subsyndromal (Lang et al., 1996). Although health professionals can play a significant role in the detection and management of postpartum depression, this affective condition is a hidden form of maternal morbidity, often remaining undiagnosed. Researchers have identified various maternal help-seeking barriers, including the inability to identify depression indicators, fear of stigmatization, not knowing where to obtain assistance, and cultural factors. While several of these factors are common help-seeking barriers, further research is required to determine how to effectively addresses these obstacles as they pertain specifically to postpartum depression. Furthermore, options to increase knowledge among various health professionals should be examined and may include psycho-education, referral information, and practice guidelines (Boyd, Pearson, & Blehar, 2002). While competing demand models suggest that requesting health professionals to "do more" will be a challenge, significant gains in postpartum depression detection and management will not be obtainable without their systematic participation.

To aid in the detection of postpartum depression, screening procedures have been suggested. However, for a program to be effective, screening tests are required to have good sensitivity, specificity, and positive predictive values. Unfortunately, the diagnosis of postpartum depression can generally only be achieved through the application of a standardized interview by a trained mental health professional. To assist in the assessment of maternal mood, diverse self-report questionnaires have been employed. However, some measures were developed for the use in general populations (e.g., the Beck Depression Inventory and the General Health Questionnaire) resulting in unreliable scores in postpartum samples, primarily due to the similarity between the normal changes occurring in the postpartum period and symptoms indicating depression. It is also noteworthy to remember that, in general, different self-report measures assess various dimensions of the concept 'depression' resulting in the detection of differing subgroups. To overcome these

conceptual and psychometric limitations, postpartum depression specific questionnaires have been created. Undoubtedly, the most widely utilized instrument to screen for postpartum depression or assess maternal mood is the Edinburgh Postnatal Depression Scale (EPDS). This 10-item self-report instrument is not only convenient and acceptable to women but also easily interpretable and readily incorporated into practice. For example, the public health department in Edmonton, Alberta has completed a feasibility project with plans to screen all new mothers through the universal well-baby clinics. In the pilot stage, the researchers found good consumer satisfaction with the EPDS and that the screening could be successfully added to the task of the public health nurse (McLennan & Offord, 2002). Similar findings were found in the Fraser Valley, British Columbia where public health nurses incorporated a screening EPDS into their 8-week immunization clinics (Dennis, 2003).

While this measure has been validated among diverse cultures resulting in varying sensitivity and specificity values, it is difficult to compare research results due to the various (1) methods of assessment, (2) cut-off criteria, and (3) timing of assessments. Although these psychometric limitations are not unique to the EPDS, the methodological explanations justify only some of the discrepancies found between the EPDS translation and validation investigations. Significant differences in proportions of high EPDS scores across different cultural contexts were noted in an international multi-site study conducted by Affonso et al. (2000) suggesting that cultural factors merit further attention. In addition, further research is required to determine if indeed the EPDS is the most appropriate screening instrument, as the Postpartum Depression Screening Scale (Beck & Gable, 2000, 2001a, 2001b) has been recently developed based on qualitative interviews. As such, a comparative analysis would be prudent.

One general problem with screening instruments is that the continuous data (i.e., scores on the instruments) obtained are dichotomized into positive and negative results at an arbitrary cut-off value and then used to calculate sensitivity and specificity (as well as positive and negative predictive values). However, with this approach important information is lost as all scores above and below the threshold are counted equally. To avoid missing mothers with or at-risk for postpartum depression, a cut-off score of 9/10 is suggested for population-based screening. While this may lead to a high number of false positives and women deemed ‘at-risk,’ preliminary research suggests that a two-stage screening process may effectively address this issue (Wickberg & Hwang, 1996a, 1997). Another potential concern with the published EPDS cut-off scores are that the recommendations are based primarily on Caucasian or homogeneous samples. While a review of the presented EPDS translation and validation studies suggests that a 9/10 cut-off would be appropriate for most populations, it is unclear if this cut-off score is valid for a heterogeneous multicultural population.

Another general difficulty in measuring the accuracy of screening instruments is related to interpreting specificity. Instruments used in some studies to detect major depression may count women with

subsyndromal depression as false positives. A true measure of specificity would count as false positives only those women who are free from any significant depressive illness but who screened positive. This more accurate approach may be appropriate as women with subsyndromal illnesses may also benefit from treatment or observation that is more careful. Women with other important and treatable conditions such as anxiety, complicated grief reactions, or bipolar disorders may also be counted as false positives, but they might well be identified by the more in-depth assessment that would presumably follow a positive screen. If management of postpartum depression is initiated on only the basis of screening positive, then women with other related illness may receive sub-optimal care.

Finally, some researchers have recommended that the presence of known risk factors for postpartum depression can be employed to determine who should be screened – a strategy of selective screening. Although intuitively appealing, most common risk factors for postpartum depression perform relatively poorly in discriminating between high- and low-risk women or those who are currently depressed or not. For example, this review and the one conducted by Austin and Lumley (2003) has shown that while many different antenatal screening instruments have been created to identify women at-risk for postpartum depression, even the most well designed studies incorporating these instruments have low positive predictive values. The exclusion of salient risk factors, such as a history of depression or personality traits, is one possible explanation for the poor sensitivity and specificity of these antenatal-screening measures. However, the inclusion of postpartum variables such as birth experiences and infant mood, while potential risk factors may also limit the sensitivity and specificity of these antenatal screening measures. The need to develop a predictive tool that is clinically useful and has acceptable sensitivity and specificity remains and it has been suggested that a broader set of risk factors will need to be included (Austin & Lumley, 2003).

While there is good evidence to support the recommendation that *antenatal* screening to identify high-risk mothers should not be implemented into practice until additional methodological research has been completed, the saliency of maternal mood in the immediate postpartum period also warrants further exploration as a possible time to screen *postnatally*. Included in this research is the need to determine which time period is most effective in identifying high-risk mothers based on diverse ethnic groups. For example, researchers have reported that among Hong Kong women the postpartum supportive practice of ‘doing the month’ may have a protective effect and suggested that the pre-eminent time to screen for postpartum depression is at 6 weeks postpartum (D. Lee et al., 1998). Conversely, interviews with Caucasian women suggest that their depression began within the first 4 weeks postpartum. In multicultural communities, this poses a serious limitation for health professionals as they consider developing a systematic postpartum screening program.

While further research is required to improve screening accuracy, the effect of screening on diverse outcomes has only been partially explored. Several studies have examined the effect of screening, compared

to usual care, on the recognition and diagnosis of postpartum depression. These studies have documented that postpartum depression is often unrecognized or under-treated by 'usual care' or non-systematic approaches to diagnosis and management. However, significant gaps exist in the extant literature related to other postpartum depression screening outcomes. For example, few studies have been found evaluating the effect of screening on the receipt of appropriate treatment (Schaper et al., 1994), although a recently unpublished study adds to this body of literature (Chaudron, Szilagyi, Kitzman, & Conwell, 2002). In the general depression literature, a systematic review examining screening for depression in adults (Pignone et al., 2002) found the effect of screening on treatment was variable. In particular, several studies found small, non-significant increases in the proportion of patients treated for depression (Dowrick, 1995; Linn & Yager, 1980; Williams et al., 1999) while others noted an increase in antidepressant prescribing but not referral for counselling or psychiatric care (Callahan et al., 1994) or a significant 10% increase in appropriate treatment (Wells et al., 2000). Unfortunately, these results are not directly applicable to postpartum depression and further research is warranted.

Similarly, research related to the effect of screening on postpartum depression outcomes is also limited. However, a current trend in a number of countries is the preparation of guidelines and care pathways for the detection and management of pregnant and postpartum women with mental illness (Henshaw & Elliott, 2002). For example, in Scotland care pathways have been designed by a multidisciplinary group that consists of eight minimum care standards based on the recommendations presented by the SIGN National Clinical Guideline for Scotland on Postnatal Depression and Puerperal Psychosis (Robertson & Cantwell, 2002). The pathway is initiated at the primary booking for antenatal care and continues for the first year postpartum, with midwives and health visitors leading the implementation of the care standards. While the care pathway and recording tool has been piloted for 12 months and evaluated, results from this pilot have yet to be published. According to these researchers, the pathway has ensured that women are screened antenatally for puerperal psychosis risk factors and relapse of pre-existing serious mental illness. Women are offered additional support during pregnancy and high-risk women are referred to psychiatric services for prevention management. All women are screened postnatally for early signs of puerperal psychosis and the EPDS is administered to aid detection of depression at two recommended points postnatally; these time points were not reported. Women identified with mental illness are subsequently offered interventions at the appropriate level of service provision. In Scotland, the emphasis on the detection and management of mental illness antenatally and postnatally is variable with women receiving differing standards and level of care largely dependent upon the geographical area in which they lived. According to the researchers, the care pathway ensures the delivery of a minimum evidence-based standard of care for all women. While these care pathways are promising, it is unknown whether this approach either improves the number of women receiving appropriate treatment or decreases the number of women who experience postpartum depression. A

cluster randomized controlled trial is required to compare 'usual care' with 'care pathways' to determine the effect on the receipt of appropriate management and postpartum depression outcomes.

In the general depression literature, the effect of screening on clinical outcome of depression is wide-ranging. In a systematic review examining screening for depression in adults (Pignone et al., 2002), two small, older trials found significant improvements in major depression (Johnstone & Goldberg, 1976; Zung & King, 1983) while two larger, well-designed trials found moderate improvements (9%) in remission from depression in a population with variable depression diagnoses (Wells et al., 2000; Williams et al., 1999); four other studies found small or no improvements in depressive outcomes (Callahan, Dittus, & Tierney, 1996; Callahan et al., 1994; Reifler, Kessler, Bernhard, Leon, & Martin, 1996; Whooley, Stone, & Soghikian, 2000). Again, these results are not directly transferable to a postpartum depression population.

In summary, several studies have examined the effect of providing feedback on postpartum depression screening results to health professionals with the rate of detection increasing from 0% to over 35%; the effect of screening on the receipt of appropriate treatment or postpartum depression outcomes was only reported by one study (Schaper et al., 1994). In the general depression literature, the results of appropriate treatment and improved depression outcomes are equivocal. Thus, although the effect of screening on diagnosis appears robust, improvements in more distal variables such as treatment and depression outcomes are unknown. Translating the increased rates of detection with screening into improved outcomes may require that particular attention be paid to initiation and maintenance of effective preventive/treatment interventions, perhaps in the form of a quality improvement effort or other programs systematically designed to provide appropriate care. Demonstrating improvements in clinical outcomes (as measured by the proportion of women still depressed) requires large samples, as studies with smaller sample sizes may be unable to demonstrate statistically significant results despite finding clinically significant differences in recovery. Furthermore, according to Pignone et al. (2002), major depression appears more responsive to interventions with screening than minor depression. As such, well-designed trials are needed and should include a discussion as to whether the appropriate outcome measure for minor postpartum depression is the same as major postpartum depression -- a failure to demonstrate changes in the proportion of women depressed may not be a reasonable test for mothers with subsyndromal illnesses.

A range of potential strategies exist in relation to screening results and include (1) simple feedback of scores obtained from screening measures, (2) feedback provided by a health professional who has received postpartum depression training, (3) feedback that can incorporate standard or individualized treatment advice, and (4) integrated recognition and management approaches that rely on multiple system supports within the clinical setting to assure prompt, coordinated follow-up. Intensive, integrated identification and management that incorporates quality improvements in clinical practice may prove to be effective in

population-based screening programs (Pignone et al., 2002). Future research comparatively evaluating these strategies should be significantly powered to detect clinically important differences in effectiveness.

It is noteworthy that no economic analysis has addressed the question of whether a modest improvement in postpartum depression outcomes warrants the increased effort of screening and providing systematic support for management (i.e., treatment or prevention). Cost-effectiveness data from two recent trials of systematic efforts to screen for general depression and provide integrated support for treatment (Schoenbaum et al., 2001; Wells et al., 2000) suggest that such programs can be implemented efficiently and produce cost-effectiveness ratios similar to those of other commonly performed preventive services, such as screening for mammography in women older than 50 years of age or treatment of mild to moderate hypertension (Pignone et al., 2002). Further research is required to determine which components of these integrated programs are most effective and to determine whether more efficient means of delivering effective care is possible.

The overarching question – whether screening and subsequent management is superior to management based on usual means of identification as 'high-risk'– is controversial. It is unknown whether further support beyond identification improves management adherence and clinical outcomes. A recent study by Wells et al. (2000) suggests that a simple 2-question screener, when coupled with a quality improvement process, can improve outcomes over 6 to 12 months in patients with a spectrum of depressive disorders. While this has not been specifically evaluated with postpartum women, a well-designed cluster randomized controlled trial to assess community postpartum care that was redesigned to identify and manage individual needs, including postpartum depression, showed a significant decrease in maternal depression at 16-weeks postpartum (MacArthur et al., 2002). The results from this UK study suggest that screening (as part of the intervention) improved the identification of postpartum depression such that effective care could be provided. This trial should be replicated within a North America context.

The potential benefits of screening and preventing/treating postpartum depression include reduced maternal and infant morbidity, enhanced quality-of-life functioning, and improved child health outcomes; it may also decrease health service utilization (Webster et al., 2001). The potential harms of screening include (1) false positive results, (2) adverse effects of treatment, (3) negative effects and cost of treatments for women who are incorrectly identified as being depressed, and (4) potential labelling and stigmatization; there is also the question of resource implications after defining a large proportion of women as 'at-risk'(Austin & Lumley, 2003; McLennan & Offord, 2002; Pignone et al., 2002). The trade-offs between benefits and harms are an important component in the decision of whether to screen or not. Currently, there is limited information about the harms of screening and despite a wealth of studies concerning the prevalence of postpartum depression and screening accuracy, key elements of the evidence base for screening remains insufficiently developed and a strong recommendation to implement screening procedures cannot be made. Health professionals interested in the development of postpartum depression screening programs should

proceed cautiously and observe a new US Federal Initiative that plans to screen for postpartum depression women participating in the "Health Start Program," a comprehensive service for low income expectant and new mothers and their infants (Blehar, 2002).

Section II: Prevention of Postpartum Depression

Preventive interventions incorporate any strategy that (1) reduces the likelihood of a disease/condition affecting an individual (*primary prevention*), (2) interrupts or slows the progress of a disease/condition through early detection and treatment (*secondary prevention*), or (3) slows the progress of a disease/condition and reduces resultant disability through treatment of established disease (*tertiary prevention*) (Shah, 1998). These interventions can be classified into different categories depending on the target population: (1) *universal* measures are cost beneficial for everyone in the eligible population and target the whole population; (2) *selective* strategies are cost beneficial to a subgroup population who are considered to be at higher risk; and (3) *indicated* approaches can be applied to asymptomatic groups who have risk factors that could justify more costly and extensive interventions (Mrazek & Haggerty, 1994). Complex interactions of biopsychosocial risk factors with individual variations should be considered when planning intervention programs, as a single approach will not be applicable to all women. Standards for developing a preventive intervention have been suggested and when applied to postpartum depression should include:

- Establishing a base occurrence rate, recognizing that not all women with identified risk factors will develop postpartum depression.
- Determining the predictive accuracy of screening procedures such that vulnerable women are specifically identified.
- Being cognizant that screening procedures will exclude some women who will later develop postpartum depression.
- Devising interventions that are brief enough to be acceptable, long enough to achieve lasting benefits, intensive enough to have an effect, user friendly, and not too expensive.
- Assessing outcomes with regular monitoring and follow-up that includes a wide range of outcomes not just preventing the onset of postpartum depression.
- Recognizing that intervention non-compliance and participant attrition are major problems and that those who decline enrolment or withdraw from involvement may be those at greatest risk (Lorion, 1991).

Criteria used to assess potentially preventable conditions include the current burden of suffering (impact on the individual and on society), the manoeuvre (risks and benefits; screening accuracy; and safety, simplicity, cost, and acceptability), and intervention effectiveness (Shah, 1998). Applying these principles, postpartum depression is appropriate for preventive interventions as the long-term health consequences have

been established, there is an approximate marker of onset and a defined high-risk inception period (first 12 weeks postpartum), and women have frequent contact with health professions enabling intervention implementation (Wisner & Wheeler, 1994). Furthermore, specific knowledge about potentially modifiable risk and protective factors that influence the development of postpartum depression has been identified (as demonstrated in Chapter 1) to guide the nature of preventive strategies. However, translating risk factor research into predictive screening protocols and effective preventive interventions is challenging (Cooper et al., 1996). For this comprehensive review, preventive strategies have been classified into the following approaches: pharmacological, psychological, psychosocial, quality improvement, hormonal, and other diverse interventions. While there are a modest number of studies reporting the prevention of postpartum depression as the primary outcome, several additional investigations offer constructive data to ascertain whether limiting the influence of risk factors can decrease the incidence of postpartum depression; these studies will also be presented to provide the most comprehensive review of potential preventive interventions.

Pharmacological Interventions

Antidepressant Medication

Women who have suffered from one episode of postpartum depression are justifiably apprehensive regarding a recurrence with future births. In a naturalistic follow-up study of 20 women with initial episodes of postpartum depression who went on to have 33 more pregnancies, six mothers (30%) developed eight more incidences of postpartum depression, suggesting the risk of subsequent postpartum depression is approximately 1 in 4 (Davidson & Robertson, 1985). It has been hypothesized that administration of antidepressant medication to asymptomatic women in the immediate postpartum period may prevent recurrent episodes of postpartum depression. To determine the efficacy of prophylactic antidepressant medication, an open quasi-experimental study was conducted at a US outpatient clinic treating pregnant and postpartum women with mood disorders (Wisner & Wheeler, 1994). Twenty-three pregnant women, who had at least one previous postpartum episode that fit DSM-III-R criteria for major depression, were recruited where postpartum monitoring for recurrence of depressive symptoms ($\underline{n}$ = 8) was compared to postpartum monitoring plus antidepressant treatment with either a previously effective antidepressant medication or nortriptyline ($\underline{n}$ = 15). The first dose was given within 24 hours of birth and the recurrence of postpartum depression was monitored via psychiatric examinations for the first 12 weeks postpartum. Only one (6.7%) mother who elected postpartum monitoring plus prophylactic antidepressant medication in comparison to five (62.5%) women who elected postpartum monitoring alone suffered a recurrence ($\underline{p}$ = 0.009). However, 10 out of the 23 participants were treated with antidepressants during the current pregnancy; this included 7 (47%) in the prophylactic group and 3 (37%) in the monitoring only group. While antidepressant doses were

tapered off in the 2 weeks preceding delivery in order to recommence use again in the intervention group, the residual effect of this antenatal antidepressant use on postpartum depression reoccurrence is unknown thus limiting study conclusions.

Advancing this initial work, Wisner and colleagues conducted a double-blind, randomized controlled trial to evaluate the efficacy of nortriptyline in the prevention of recurrent postpartum depression (Wisner, Perel et al., 2001). Fifty-one non-depressed women who had at least one previous episode of postpartum depression meeting Research Diagnostic Criteria (RDC) were recruited antenatally and randomly assigned to receive either nortriptyline or a placebo in the immediate postpartum period. Each mother was assessed for 20 sequential weeks using the Hamilton Rating Scale for Depression. No significant group difference was found as 6 (23.1%) mothers who took nortriptyline prophylactically and 6 (24%) mothers who received a placebo suffered a recurrence (p = 1.00). Consistent with previous research, the rate of recurrence was approximately 1 in 4 women. The results from this study suggest that nortriptyline does not confer additional preventive efficacy beyond that of a placebo.

Psychological Interventions

Interpersonal Psychotherapy

Interpersonal therapy (IPT) was initially formulated as a time-limited, weekly outpatient treatment for depression provided by a trained mental health professional (Klerman & Weissman, 1993). While this method makes no assumption about aetiology, the connection between depressive symptomatology onset and interpersonal problems is used as a treatment focus. IPT as an acute treatment generally has three phases: (1) diagnosis evaluation, psychiatric/social history (including current social functioning and close relationships, their patterns, and mutual expectations), and linkage between the current interpersonal situation within one of the four interpersonal problem areas (i.e., grief, interpersonal role disputes, role transitions, or interpersonal deficits) to set the framework for treatment; (2) pursuit of strategies (defined in the IPT manual) that are specific to the chosen interpersonal problem area; and (3) encouragement to recognize and consolidate therapeutic gains and develop ways to identify and counter depressive symptoms should they arise again in the future.

To determine whether a preventive intervention based on the principles of IPT would reduce the risk of postpartum depression, two studies were found. In a US trial, 37 pregnant women receiving public assistance who had at least one risk factor for postpartum depression were randomly assigned to receive either treatment-as-usual (n = 19) or a group intervention ('Survival Skills for New Moms' consisting of four weekly 60-minute group sessions; n = 18) (Zlotnick et al., 2001). The majority of women in the intervention group (n = 15, 88%) attended three out of the four sessions and all participants completed the Beck Depression Inventory (BDI) pre and post intervention and a structured diagnostic interview (SCID) at 12

weeks postpartum; 35 mothers completed the trial. Six (33%) women in the treatment-as-usual group developed postpartum depression in comparison to no women in the intervention group. While the results of this pilot test are promising, 50% of eligible women declined study participation rendering intervention acceptability questionable.

In a similar study, 45 pregnant US women with at least one postpartum depression risk factor (e.g., current or past history of depression, family history of treatment for psychopathology, marital problems, high levels of depressive symptomatology during pregnancy (Beck Depression Inventory score above 12), or two moderately severe life stressors) were randomly allocated to either an intervention group (five individual IPT sessions, beginning in late pregnancy and ending at approximately 4 weeks postpartum; n = 24) or a control group (standard care; n = 21) (Gorman, 2001). At 4 weeks postpartum, significantly more mothers in the control group met DSM-III-R criteria for major depression than mothers in the intervention group (25% vs. 0%, p = 0.02). However, the prophylactic effects were not maintained through 24 weeks postpartum as three (15%) mothers in the intervention group compared to four (23.5%) mothers in the control group were depressed (p = 0.40). The results from this small, underpowered trial suggest that IPT may have a limited positive preventive effect.

Cognitive Behavioural Therapy

Cognitive behavioural therapy (CBT) is an approach based on the notion that the way an individual perceives an event determines in part how they will respond, both affectively and behaviourally (Hollon, 1998). According to cognitive theory, dysfunctional beliefs and maladaptive information processing lie at the core of many psychiatric disorders. As such, CBT assists the individual in identifying and correcting erroneous beliefs and systematic distortions in information processing with the hopes of reducing distress and enhancing coping efforts. Only two trials have evaluated CBT as a preventive intervention for postpartum depression. In a Finnish trial, 176 pregnant women who had severe fear of childbirth were randomly allocated at 26 weeks gestation to either intensive therapy (an average of four sessions with a CBT-trained obstetrician, one session with a midwife, a recommended visit to an obstetrical ward, telephone availability between sessions, and written information regarding vaginal birth; n = 85) or conventional therapy (an average of two sessions with an obstetrician providing standard and written information regarding vaginal birth; n = 91); follow-up questionnaires, including the Beck Depression Inventory (BDI), were completed at 4 weeks before delivery date and 12 weeks postpartum (Saisto, Salmela-Aro, Nurmi, Kononen, & Halmesmaki, 2001). While birth-related concerns decreased in the intensive therapy group, no significant group differences in BDI scores were found at 12 weeks postpartum. However, postpartum depression was not the primary outcome of this study and future research evaluating CBT sessions targeting postpartum depression is needed.

In a French study, the effect of CBT targeting both the prevention and treatment of postpartum depression was evaluated (Chabrol et al., 2002); only the preventive component will be described here. Pregnant women were screened during an obstetric clinic and at-risk women (EPDS score above 8) were randomly allocated to either a control group (usual care; n = 128) or an intervention group (n = 113), where mothers received one individualized cognitive-behavioural session on the second or third day postpartum by a clinical therapist (which included 5 master's level psychology students). This session comprised of three main components: (1) an educational element imparting information about the realities of parenthood, (2) a supportive element featuring empathetic listening, encouragement, and acknowledgement of feelings, and (3) a cognitive-behavioural element to "weaken the oppressive 'shoulds' linked to being a perfect mother." At 4 to 6 weeks postpartum, 29 out of 97 mothers in the intervention group (29.8%) and 55 out of 114 mothers in the control group (48.2%) scored above 11 on the EPDS (χ^2 = 7.36, p = 0.007); the mean EPDS score was also significantly lower in the intervention group (M = 8.5, SD = 4) than in the control group (M = 10.3, SD = 4.4; p = 0.002). While these results indicate only a medium effect size (ES = 0.42), further research is warranted.

Psychological Debriefing

The efficacy of psychological debriefing has been extensively debated in recent years (Arendt & Elklit, 2001) with the issues raised having ramifications beyond the field of psychological trauma (Deahl, 2000). Despite 17 years of research since the original description of "critical incident stress debriefing" (Mitchell, 1983), the role of acute interventions remains equivocal. The controversy began with articles by Bisson and Deahl (1994) and others (Raphael & Meldrum, 1995), which suggested that the beneficial effects of debriefing was next to non-existent. Consistent with this finding was a Cochrane systematic review that evaluated the effect of psychological debriefing in the prevention of post-traumatic stress disorder (Wessely, Rose, & Bisson, 2000). This meta-analysis concluded that there was no evidence debriefing prevented trauma-related symptoms and recommended ceasing compulsory debriefing of trauma victims. Two of the 11 trials included in this Cochrane review pertained to the prevention of postpartum depression. In a UK trial, 120 in-hospital primiparous women were randomized to receive either usual care (n = 60) or a midwifery-led debriefing session before hospital discharge lasting between 30 to 120 minutes (n = 60) (Lavender & Walkinshaw, 1998). Of the 114 women who returned the mailed Hospital Anxiety and Depression scale (HAD) at 3 weeks postpartum, significantly fewer mothers in the intervention group (n = 5; 8.6%) exhibited depressive symptomatology in comparison to those in the control group (n = 31; 53.4%). However, several methodological limitations existed, including premature timing of outcome assessment, poor measure of postpartum depression, atypical population (59.6% were single women), and a 'disappointment' factor (e.g., dissatisfaction with group allocation) that may have increased the scores of women allocated to the control group. Conversely, in a larger and well executed Australian trial involving 1041 women who had operative

deliveries (caesarean section, n = 624; use of forceps, n = 353; or vacuum extraction, n = 64), in-hospital midwifery-led debriefing had a *negative* effect resulting in a higher rate of emotional problems (Small, Lumley, Donohue, Potter, & Waldenstrom, 2000). In particular, more women allocated to debriefing group exhibited depressive symptomatology (n = 81, 17%) at 24 weeks postpartum than women allocated to usual postpartum care (n = 65, 14%), although the difference was not significant (OR = 1.24, 95% CI = 0.87 - 1.77). They were also more likely to report that depression had been a problem since delivery (n = 123, 28% vs. n = 94, 22%); again, the difference was not significant (OR = 1.37, 95% CI = 1.00 - 1.86). Thus, there is strong evidence to suggest that midwifery-led debriefing after operative birth may be ineffective in reducing postpartum depression rates and the possibility that this intervention contributed to emotional health problems for some women cannot be excluded.

Psychosocial Interventions

Antenatal and Postnatal Classes

In a pioneering study, Gordon and Gordon (1960) conducted a quasi-experimental study to evaluate the effect of antenatal classes on the prevention of 'postpartum emotional problems.' One hundred and sixty-one pregnant US women were allocated to either a control group (standard antenatal classes; n = 76) or intervention group (standard antenatal classes plus the addition of two 40-minute sessions focusing on social and psychological adjustment; n = 85). 'Emotional problems' were assessed by participating obstetricians using a 4-point scale 6 to 8 weeks postpartum; 'interjudge' reliability was 0.85. Only 15% of mothers in the intervention group experienced emotional problems in comparison to 37% of mothers in the control group ($\chi^2 = 7.3$; $p < 0.01$). Furthermore, participants in the intervention group whose husbands attended the classes had less emotional difficulties than mothers whose husbands did not attend the classes; mothers who attended both classes had fewer difficulties than mothers who only attended one class ($\chi^2 = 4.2$, $p < 0.05$). Only half the participants completed the 24-week follow-up; one (2%) out of 46 mothers in the intervention group in comparison to 10 (28%) out of 36 mothers in the control group were experiencing emotional problems ($\chi^2 = 9$; $p < 0.01$). This study has many limitations, including non-random group allocation and a non-standardized measure of postpartum depression. Furthermore, no details were provided regarding the study groups, only that they were 'matched by background history and were essentially the same make-up.' Even with these weaknesses, the results suggested that the provision of realistic, solution-focused antenatal care may positively influence maternal mental health in the postpartum period and the study provided the basis for the following four antenatal class interventions.

In an Australian trial, 144 high-risk pregnant women identified using a modified antenatal screening questionnaire were randomized to receive either three midwifery-led group sessions (two antenatally and one postnatally at 6 weeks; n = 73) or standard antenatal care (n = 71) (Stamp, Williams, & Crowther,

1995). The response rate for the mailed EPDS questionnaire at 6 and 12 weeks postpartum was 92% and 87% at 24 weeks. At 6, 12, and 24 weeks postpartum, the proportion of mothers in the intervention group with an EPDS score above 12 was 8 (13%), 7 (11%), and 9 (15%) respectively in comparison to 11 (17%), 10 (15%), and 6 (10%) mothers in the control group, indicating the intervention did not reduce postpartum depression. However, this trial has several limitations including low group attendance (31%) and a high number of women assessed as vulnerable (58%).

In a similar trial that incorporated the screening of 1300 UK women, 209 high-risk women were randomized to evaluate the effect of a structured “risk factor reducing” program titled 'Preparing for Parenthood' designed to specifically increase social support and problem-solving skills (Brugha et al., 2000). The intervention (n = 103), consisting of six structured 2-hour weekly antenatal classes and one postpartum class provided by trained nurses and occupational therapists, was compared to routine antenatal care (n = 106). Using the General Health Questionnaire Depression subscale (GHQ-D), EPDS, and the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) clinical interview with a follow-up rate exceeding 90%, no significant group differences were found in the rate of postpartum depression at 12 weeks. Specifically, 16% (n = 15) of mothers in the intervention group and 19% (n = 18) of mothers in the control group had an EPDS score above 10 (OR = 0.83, 95% CI = 0.39 - 1.79); corresponding intervention and control group rates for the GHQ-D (>1) were 26% (n = 24) and 22% (n = 21) respectively. However, only 45% of the women in the intervention group attended sufficient sessions to potentially benefit.

In another UK study, a more intensive intervention titled ‘Surviving Parenthood,’ incorporating 11 monthly meetings (5 antenatally and 6 postnatally), was conducted by a psychologist and health visitor (Elliott et al., 2000). Women expecting their first or second child and designated as 'more vulnerable' were allocated to either the preventive intervention (n = 47) or a control group (n = 52) based on expected delivery date. On average, primiparous women attend 63% of the classes while group attendance by multiparous women was 36%. Significant differences in EPDS scores and a diagnosis of depression using the Present State Examination (PSE) at 12 weeks postpartum was found between primiparous but not multiparous women. The median EPDS score for primiparous women in the intervention group at 12 weeks was 3.0 (SD = 2.50) in comparison to 8.0 (SD = 4.53) in the control group (p = 0.005). For multiparous women, the median EPDS score was 6.5 (SD = 6.10) in comparison to 9.0 (SD = 6.60) in the control group. However, methodological issues, such as inadequate sample size, lack of randomization, and significant differences between participating and non-participating eligible women, render these results debatable. It is noteworthy that in all three preceding trials, a low group attendance rate was a significant limitation.

In a pilot trial, primiparous Australian women between 12 and 24 weeks gestation were screened for postpartum depression risk factors based on a researcher-developed 'risk factor scale' (Buist et al., 1999). A score on this scale reflected a mix of three or more risk factors related to personal/family history of depression, premenstrual syndrome, and marital/childhood difficulties. Women scoring above 7 were viewed to be 'at-risk' and randomly allocated to receive either standard antenatal classes (n = 21) or intervention classes (n = 23), facilitated by a midwife and another health professional which consisted of 10 structured sessions (8 antenatally and 2 postnatally) focusing on parenting and coping. The provision of support by the facilitators outside of the sessions was also available. All participants completed the Beck Depression Inventory (BDI) and EPDS at 6 and 24 weeks postpartum; 16 (70%) mothers in the intervention group and 12 (57%) mothers in the control group completed the 24-week questionnaire. No significant group differences in depressive symptomatology were found at either assessment period. In particular, mean EPDS scores at 6 and 24 weeks for mothers in the intervention group were 7.40 and 7.57 versus 9.06 and 8.09 for mothers in the control group ($p > 0.05$). In addition to the study limitations of a small sample size, inexplicit randomization procedures, significant group differences in baseline characteristics, and unreported intervention attendance rate, the screening questionnaire employed was not previously evaluated and no participant in either group had an EPDS score above 12 at any time, signifying the tool had poor sensitivity, specificity, and predictive power.

Intrapartum Support

As the modern obstetric era emerges, labouring women have become more isolated from the community of supporters that were once a defining feature of childbirth. Although partners and relatives are allowed to be present during delivery, a considerable number of women still experience labour without continuous support. Furthermore, obstetrical care during the past several decades has viewed labour as a high-risk situation necessitating interventions and imposed restrictions. As such, the clinical environment of childbirth may have adverse effects on psychological outcomes, including the development of postpartum depression. To test this hypothesis, two trials have been conducted evaluating the effect of doula support (i.e., labour support provided by an experienced lay woman). In a South African trial, 189 women labouring alone in a local community hospital were randomly allocated to receive either additional companionship (a minimum of 5 hours of labour support from one of three volunteer companions recruited from the community; n = 92) or usual care (n = 97) (Wolman et al., 1993). At 6 weeks postpartum, the Pitt Depression Inventory was completed during a postpartum visit; 40 mothers (21%) were lost to follow-up. Mothers receiving the supportive intervention had lower mean depression scores (M = 10.4) than mothers in the control group (M = 23.3) ($p < 0.001$). However, a serious study limitation was the poor measure of postpartum depression, which does not have a cut-off score for depression. This study was then continued with another 73 women enrolled and the EPDS, instead of the Pitt Depression Inventory, was administered at 1 year postpartum (Nikodem,

Nolte, Wolman, Gulmezoglu, & Hofmeyr, 1998); only 50% of mothers completed this questionnaire (64/126 mothers in the support group; 67/136 in the control group). The poorly reported study with conflicting sample size totals showed no significant group differences (intervention group M = 11, SD = 5.31 vs. control group M = 11, SD = 0.60, p = 0.78). In a larger US trial involving three health maintenance organization-managed hospitals, nulliparous women were randomized to receive either usual care (n = 165) or support from a doula (n = 149) (Gordon et al., 1999). Data were obtained from phone interviews conducted at 4 to 6 weeks postpartum with the results showing no significant group differences in mean postpartum depression scores. Again, a serious trial limitation was the poor measure of postpartum depression, which consisted of five items on the SF-36.

To evaluate the effectiveness of professional labour support, a randomized controlled trial with prognostic stratification by centre and parity was conducted (Hodnett et al., 2002). Thirteen Canadian and US hospitals randomized 6915 women to receive either usual care (n = 3461) or continuous labour support by a specially trained nurse (n = 3454). While the primary outcome measure was caesarean delivery rate, other outcomes included maternal mood at 6 to 8 weeks postpartum. Of the 81% of participants who returned the follow-up questionnaire, 245 (8.7%) women in the continuous labour support group had EPDS scores above 12 in comparison to 277 (10.1%) women in the usual care group (p = 0.08). This well conducted trial suggests that continuous labour support has no protective effect on postpartum depression.

Supportive Interactions

Diverse supportive interventions, including nursing home visits, home-based lay support, postpartum support groups, and self-help manuals, have been suggested to have a protective effect in the development of postpartum depression. To evaluate the effect of these supportive interventions in the prevention of postpartum depression, five trials have been conducted. In an Australian trial that targeted families where the child, for environmental reasons, was at greater risk of poor health and developmental outcomes (N = 181), the effect of extensive nursing home visits on diverse outcomes, including postpartum depression at 6 and 16 weeks postpartum, was evaluated (Armstrong, Fraser, Dadds, & Morris, 1999, 2000). Women were recruited in the immediate postpartum period based on self-reported vulnerability factors and randomly allocated to receive either a structured program of nurse home visiting (weekly to 6 weeks, fortnightly to 12 weeks, and monthly to 24 weeks postpartum; n = 90), or standard community child health services (control group; n = 91). Mothers who received the intervention had lower EPDS scores at 6 weeks postpartum (M = 5.67, SD = 4.1) than mothers in the control group (M = 7.90, SD = 5.9) (p = 0.004) with only 5.8% scoring above 12 on the EPDS in comparison to 20.7% of mothers in the control group. At the 16-week follow-up, 160 families (80 intervention, 80 control) were available for assessment and the earlier difference in EPDS scores was not maintained (intervention group M = 5.75, SD = 5.5; control group M = 6.64, SD = 5.6). While only 63% of mothers in the immediate postpartum period took the time to complete the pre-trial screening questionnaire

and significant group differences existed related to baseline characteristics, this targeted home-based intervention has several strengths including good randomization process, a power analysis, valid instruments, and low losses to follow-up.

To assess outcomes in mothers who received either the First Parent Health Visitor Scheme (FPHVS), or conventional ("generic") health visiting, retrospective data on 2113 UK families were collected during 1986-1992 as part of National Health Service (NHS) service provision (Emond et al., 2002). Prospective data were collected during 1993-1998 on 459 mothers and their children (65% acceptance rate), with outcomes assessed at 6 weeks, 1 year (93% follow-up), and 2 years (80% follow-up) via self-report questionnaires. The goal of the intervention was to "help, support, and advise mothers during their first phase of parenting" which contrasted with conventional health visiting in that it targeted primiparous mothers, emphasized empowerment, and incorporated written materials. Mothers in the intervention group were visited at home antenatally (in the third trimester), immediately after birth, at 3 weeks postpartum, and then every 5 weeks until the infant was 8 months old; approximately 20% of mothers with special difficulties continued to receive the FPHVS until 2 years of age. The results indicated that more mothers in the prospective group (FPHVS) than the retrospective comparison group (conventional health visiting) scored 'at least' 12 on the EPDS in the antenatal period (37% vs. 30%); these initial differences were still apparent at 6 weeks postpartum (25% vs. 19%) and at 1 year (14% vs. 9%). By 2 years, the overall number of women with depressive symptomatology had increased, but there was no meaningful difference between the two groups (17% vs. 16%). Important study limitations included the retrospective/prospective cohort design, group differences in baseline EPDS scores, and significant differences between women who agreed to participate in the study and those who refused.

Recognizing a current trend in health care, and perinatal care in particular, a recent UK trial evaluated the effect of lay support in addition to usual postpartum care provided by midwives (Morrell, Spiby, Stewart, Walters, & Morgan, 2000). Mothers were randomly allocated to receive either usual care ($\underline{n}$ = 312) or additional support ($\underline{n}$ = 311), which consisted up to 10 home visits in the first month postpartum provided by trained community postnatal support workers. At 6 weeks postpartum, there was a significant difference in EPDS scores favouring the *control* group (intervention group $\underline{M}$ = 7.4, $\underline{SD}$ = 5.2; control group $\underline{M}$ = 6.7, $\underline{SD}$ = 5.5; $\underline{p}$ = 0.05) and no difference at 24 weeks (intervention group $\underline{M}$ = 6.6, $\underline{SD}$ = 5.1; control group $\underline{M}$ = 6.7, $\underline{SD}$ = 5.6; $\underline{p}$ = 0.73). This well-designed trial demonstrates that unstructured support has no protective effect above the regular home visits already provided by midwives.

Finally, a randomized controlled trial with a 2 x 2 factorial design was conducted to evaluate two interventions: (1) an 'invitation' to a local postpartum support group run weekly by a trained midwife starting at 2 weeks postpartum and (2) a postpartum support manual, mailed at 2 weeks postpartum (Reid, Glazener, Murray, & Taylor, 2002). One thousand and four primiparous Scottish women were recruited with

83% finishing the baseline questionnaire and 71% completing the 24-week follow-up. There were no significant differences in EPDS scores between the control and intervention groups at 12 and 24 weeks either with the proportion scoring above 11 or for mean EPDS scores. The 95% CI for the difference in EPDS scores effectively excluded a change in mean score of more than 10% with either intervention. While only 40% of mothers randomized to the support group attended six or more meetings, women reported favourably on the mailed postpartum support manual. The results from this trial suggest that wide-scale provision of either support groups or self-help manuals may not be appropriate if the aim is to improve measurable mental health outcomes; further research is recommended to replicate these findings.

Quality Improvement Interventions

Continuity of Care

Based on policymakers' suggestions that continuity of care may increase women's satisfaction, new models have been proffered, including team midwifery care. Today in the UK, midwife-managed programs of care are being implemented despite diminutive research demonstrating efficacy. To compare midwifery-managed care with shared care (i.e., care divided among midwives, hospital physicians, and general practitioners) a randomized controlled trial of 1299 pregnant women who had no adverse characteristics at booking (consent rate 82%) was conducted; postpartum depression was a psychosocial outcome (Shields, Reid, Cheyne, & Holmes, 1997). A total of 1299 women were randomly allocated to receive either midwifery-managed care (n = 648) or shared care (n = 651) with 68% returning questionnaires at 7 weeks postpartum. Women in the midwifery-managed group had significantly lower EPDS scores (M = 8.1, SD = 4.9) in comparison to mothers in the shared care group (M = 9.0, SD = 4.9; t = -2.6, 95% CI = -1.6 to -0.2, p = 0.01). However, non-significant group differences were found in relation to EPDS scores above 12 (midwifery-managed group, 71/426, 16.7% vs. shared care group, 84/362, 23.2%). It is noteworthy that women in the midwifery-managed group were significantly more likely to return their questionnaire and that a 9-item EPDS was used to determine depressive symptomatology instead of the psychometrically tested 10-item EPDS; the self-harm item was deleted.

The effect of team midwifery in the standard clinic and hospital environment was further evaluated in Australia where low-risk women in early pregnancy were randomly allocated to receive either team midwifery care (n = 495) or standard care (n = 505) (Waldenstrom, Brown, McLachlan, Forster, & Brennecke, 2000). Physicians attended most women in standard care where caregiver continuity was lacking. Based on mailed questionnaires at 8 weeks postpartum, team midwifery was associated with increased satisfaction. However, no significant group differences were found in relation to depressive symptomatology as 16% of women in the midwifery care group in comparison to 12% in the standard care group exhibited EPDS scores above 12 (p = 0.19).

Early Postpartum Follow-Up

Traditionally, women have been advised to attend a 6-week postpartum check-up with their primary health care provider. However, some researchers have hypothesized that postpartum care initiated earlier may either prevent or allow for the early identification and management of problems including postpartum depression. For example, in a US quasi-experimental study the effect of support initiated early by the mother and neonate's future primary care provider (paediatrician or nurse practitioner) was evaluated (Serwint et al., 1991). Mother-neonate pairs, were randomized to either a control group (routine postpartum care including first clinic visit at 2 weeks postpartum; n = 122) or an intervention group (nursery visit by the primary care provider at 24 to 36 hours after delivery combined with 24-hour telephone access and a provider-initiated call 2 to 3 days post-discharge to answer any further questions; n = 129). All participants were interviewed at 8 weeks postpartum, which included the Center for Epidemiological Study of Depression Scale (CES-D). While more mothers in the intervention group made a scheduled clinic visit in the first 30 days, sought some form of care at the clinic, and tried to reach their physician by phone than mothers in the control group, no significant difference in CES-D scores was found between the two groups. In particular, mothers who received the intervention had similar CES-D scores (M = 11.54) as mothers in the control group (M = 13.65) (p = 0.11) with 29% scoring above 16 on the CES-D in comparison to 39% of mothers in the control group (p = 0.18). Study limitations include a poor randomization method and measure of postpartum depression.

In Australia, a randomized controlled trial incorporating 683 mothers was conducted to investigate whether an earlier postpartum check-up visit to a general practitioner decreased depressive symptomatology and other negative health outcomes (Gunn, Lumley, Chondros, & Young, 1998). All participants received a letter and appointment date to visit a general practitioner for a check-up: the intervention group for 1 week after hospital discharge, the control group for 6 weeks postpartum. Based on postal questionnaires (average response rate was 67.5%), the percentage of women scoring above 12 on the EPDS at 12 weeks (intervention group = 16.6% vs. control group = 13.6%; $\chi^2 = 0.8$, p = 0.37) or 24 weeks (intervention group = 11.6% vs. control group = 12.8%; $\chi^2 = 0.2$, p = 0.69) postpartum did not differ significantly between the two groups. The researchers of this well conducted trial concluded that to make clinically important improvements in maternal health more is required than early postpartum follow-up by general practitioners.

Home versus Clinic Follow-Up Visit

In addition to evaluating the timing of postpartum follow-up visits on maternal mood, the setting has also been examined. To compare the health outcomes of home versus clinic follow-up visits after early postpartum hospital discharge, 1163 medically and socially low-risk mothers with uncomplicated deliveries were randomly allocated to receive either home visits by trained nurses (n = 580) or paediatric clinic visits by nurse practitioners or physicians (n = 583) on the third or fourth postpartum day (Lieu et al., 2000). In

contrast with the 20-minute paediatric clinic visits, the home visits were longer (median = 70 minutes), included preventive counselling about the home environment, and involved a maternal physical examination. Diverse health outcomes, including depressive symptomatology, were assessed via telephone at 2 weeks postpartum. No significant group differences in CES-D scores (cut-off 16) were found (intervention group n = 126, 22% vs. control group n = 123, 22%). However, in this trial, only half of the women at the recruiting hospitals were eligible for participation due to stringent inclusion criteria. Furthermore, the CES-D has limited psychometric testing in the immediate postpartum period and was administered prematurely to truly evaluate the preventive effect. It is also important to note that the comparison test in this study was between a home and clinic visit after hospital discharge; a group in which mothers received no early routine follow-up was not included.

Flexible Postpartum Care

In a well-designed cluster randomized controlled trial to assess community postpartum care that was redesigned to identify and manage individual needs, 36 UK general practice clusters were randomly allocated to either an intervention (n =17) or control (n = 19) group (MacArthur et al., 2002). Midwives from the practices recruited participants and provided care in both groups. Of the 2064 participating women, 1087 (53%) were in practices randomly assigned to the intervention group (midwifery care that was extended to 12 weeks postpartum with no routine contact with general practitioners and incorporated the use of a symptom checklist and the EPDS to identify and guide the management of health needs) and 977 (47%) were in practices assigned to the control group (seven midwifery home visits to 10 to 14 days postpartum, care from health visitors thereafter with general practitioners completing routine home visits and a final 6 to 8 week check-up). Multilevel analysis accounted for possible cluster effects. In total, 801 (77%) of 1087 women in the intervention group and 702 (76%) of 977 mothers in the control group returned the 16-week postal questionnaire. Women's EPDS scores were significantly lower in the intervention group than in the control group (OR = 0.57, 95% CI = 0.43 - 0.76) with 14.4% of mothers in the intervention group scoring above 12 on the EPDS in comparison to 21.3% of mothers in the control group (p = 0.01). The numerous study strengths, including cluster design, training of midwives for intervention standardization, good randomization process, power analysis, intent-to-treat data analysis, and valid timing and measure of postpartum depression, indicate that redesigning care so that it is flexible and tailored to individual needs may help to improve women's mental health and reduce probable depression at 16 weeks postpartum.

Hormonal Interventions

Despite the fall in circulating progesterone and oestrogen in the immediate postpartum period, researchers have failed to consistently demonstrate a link between hormone levels and postpartum depression (Harris, Johns et al., 1989; Harris et al., 1996). For example, O'Hara and colleagues compared hormone

concentrations for childbearing women who became depressed versus those who did not. Frequent assays of prolactin, progesterone, estradiol, free and total estriol, and cortisol and urinary free cortisol during pregnancy and immediate postpartum revealed few differences (O'Hara, Schlechte, Lewis, & Varner, 1991). However, failure to demonstrate endocrinological evidence of hormone deficiencies does not exclude them as aetiological factors as both oestrogen and progesterone have psychoactive properties. As such, several researchers have evaluated diverse hormonal prophylaxis.

Oestrogen Therapy

In an open-label US study, seven women with histories of postpartum psychosis and four with histories of postpartum depression were consecutively treated with high-dose oral oestrogen immediately following delivery (Sichel, Cohen, Robertson, Ruttenberg, & Rosenbaum, 1995). None of the women had histories of non-puerperal affective disorder and all were affectively well throughout the current pregnancy. The intervention consisted of oral Premarin daily in decreasing dosages over 4 weeks. A high dose was chosen in the first few days postpartum to try and approximate term pregnancy estradiol levels before a gradual taper, designed to cushion the usual fall to follicular phase estradiol levels. Women were evaluated daily for mood and neurovegetative symptoms during the first 5 days postpartum using a DSM-III-R checklist. Follow-up was conducted at 1, 3, 6, and 12 months postpartum via clinical interview. All but one participant remained non-depressive and required no treatment with psychotropic medications during the 1-year follow-up period. The low rate of relapse in this small descriptive study suggests further research is warranted in the prophylactic ability of oral oestrogen in the immediate postpartum period among mothers at risk for a reoccurrence of postpartum affective disorders. However, it is noteworthy that research has failed to demonstrate a consistent relationship between postpartum depression and breastfeeding (which induces lower oestrogen levels) clearly challenging the claim that oestrogen therapy will be a useful preventive approach (Wisner & Stowe, 1997).

Progesterone Therapy

Dalton popularized the prophylactic use of progesterone for postpartum depression (Dalton, 1976, 1994). For example, in an open-label study where women who had previously experienced postpartum depression self-selected to take prophylactic progesterone treatment, a reduction from 68% to 10% was demonstrated in the reoccurrence rate (Dalton, 1985). In contrast, two double-blind randomized controlled trials of progesterone for premenstrual syndrome, which is thought by some researchers to have a similar hormonal aetiology as postpartum depression, found no significant differences between treatment and placebo groups (Freeman, Rickels, Sondheimer, & Polansky, 1995; Sampson, 1979). However, synthetic progestogens have been implicated in causing depression among women using them for contraception

(Wagner, 1996; Wagner & Berenson, 1994). Thus, there is evidence to support the possibility that progesterone may either reduce or increase the risk of postpartum depression.

To address this question, Lawrie and colleagues conducted a double-blind randomized controlled trial to determine the effect of a long-acting progestogen contraceptive, norethisterone enanthate, administered postnatally on postpartum depression (Lawrie, Hofmeyr, De Jager et al., 1998). One hundred and eighty postpartum women using a non-hormonal method of contraception were recruited from a tertiary hospital in Johannesburg, South Africa. Women were randomly allocated within 48 hours of delivery to either a progestogen (a single dose of norethisterone enanthate 200mg [1 ml] by intramuscular injection; n = 90) or placebo (1ml of normal saline placebo by intramuscular injection; n = 90) group. Mothers completed the EPDS and Montgomery-Asberg Depression Rating Scale (MADRS) as part of a clinical interview at 1, 6, and 12 weeks postpartum. In comparison to the placebo group, women receiving the progestogen injection were at a significantly greater risk of developing depressive symptomatology by 6 weeks postpartum. The relative risk of scoring above 9 on the MADRS and above 11 on the EPDS for women in the intervention group was 2.56 (95% CI = 1.26 – 5.18) and 3.04 (95% CI = 1.52 – 6.08) respectively. No significant group differences were found at 12 weeks, of which the researchers hypothesized was related to the fact that only a single dose was administered. The results from this well conducted trial, incorporating good randomization and blinding methods, a power analysis, intent-to-treat data analysis, and valid measures, indicate that progestogen contraceptives should be used with caution in the postpartum period. It should also be noted that less than one-quarter of eligible women approached agreed to trial participation.

Thyroid Function

Research suggests that women who are positive for thyroid antibodies in pregnancy are at-risk of developing postpartum depression (Harris, Fung et al., 1989; Pop et al., 1993). To test the hypothesis that stabilizing thyroid function postnatally by administering daily thyroxine reduces the rate of occurrence and severity of associated depression, a randomized double-blind placebo-controlled trial was conducted in the UK where 100 microg of thyroxine or placebo was given daily to 446 thyroid-antibody-positive women (342 of whom were compliant) from 6 to 24 weeks postpartum (Harris et al., 2002). Maternal mood and thyroid status were assessed at 4-weekly intervals. There was no evidence that thyroxine had any effect on the occurrence of depression. This well-conducted trial provides preliminary good evidence that the higher rate of postpartum depression in thyroid-antibody-positive women is not corrected by daily administration of thyroxine. The researchers also suggested that the negative findings indicate that postpartum depression is most likely associated with known risk factors, such as negative life events, than abnormal biochemical thyroid function.

Other Interventions

Educational Strategies

Frequent contact with health professionals during pregnancy presents an ideal situation for the provision of information, with proponents of antenatal education claiming that such knowledge is a crucial factor in the maintenance of women's health during pregnancy and their preparation for childbirth. To determine the effect of antenatal education on the prevention of postpartum depression, a randomized controlled trial was conducted in Australia (Hayes et al., 2001). Two-hundred and six primiparous women were randomized to either a control group (usual antenatal care; n = 103) or an intervention group (n = 103), which consisted of an educational package that included an informational booklet, a studio-quality audio-tape of one woman's journey through postpartum depression, and an experienced midwife to guide the participant through the package. Women were given the option of receiving the intervention at either the antenatal clinic or their home between 28 to 36 weeks gestation. Depressive symptomatology was assessed using the Profile of Mood States (POMS) questionnaire, which was administered once antenatally at 12 to 28 weeks gestation and twice postnatally at 8 to 12 and 16 to 24 weeks; 188 mothers, 95 in the intervention group and 93 in the control group, completed the study protocol. No significant group difference was found on the depression subscale. Median scores for both the intervention and control groups ranged from 4.0 to 5.0 at all time periods ($p > 0.05$). Serious trial limitations included the poor measure of postpartum depression and that the follow-up assessment was completed by a research assistant not blinded to group allocation. While this trial suggests that antenatal education may not prevent postpartum depression, a small descriptive Japanese study (N = 40) found that an antenatal class provided by a psychiatrist and midwife as part of an obstetric-psychiatric liaison service that included postpartum depression information and availability of postpartum resources, may decrease the severity of postpartum depression and the time between onset of depressive symptoms and seeking professional help (Okano et al., 1998).

Relaxation with Guided Imagery

Relaxation is the state of being free from physiological and psychological tension while imagery includes all thoughts that evoke a sensory component which are not only visual but can also be in the form of auditory, motor, tactile, gustatory, and olfactory (Rees, 1995). Relaxation and imagery are often used together due to the reciprocal nature in which imagery can enhance the relaxation process and relaxation subsequently promotes image visualization. To determine the effect of relaxation with guided imagery on anxiety, depression, and self-esteem, 60 primiparous US women were recruited from a postpartum unit and randomly allocated to either a control group (4-week daily tape-recording of music for 15 minutes; n = 30) or intervention group (4-week daily tape-recording of relaxation with guided imagery protocol for 15 minutes; n = 30) (Rees, 1995). Using the Center for Epidemiological Studies Depression Scale (CES-D), mothers who

received the intervention had less depressive symptomatology at 4 weeks postpartum than mothers in the control group (intervention M = 1.37, SD = 0.32 vs. control M = 1.64, SD = 0.53; t = -2.35, p = 0.01). However, the inexplicit randomization and study procedures, small sample size, and weak measure of postpartum depression all make these results questionable. Furthermore, it is unknown how many women declined trial participation, rendering intervention acceptability undeterminable.

Table 2-3. Postpartum Depression Preventive Studies

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Antidepressant Medication				
(Wisner & Wheeler, 1994)	Quasi-experimental	23 US pregnant women who had at least 1 previous episode of PPD[1] (DSM-III-R criteria) I = 15 mothers C = 8 mothers	Postpartum monitoring plus post-birth treatment with either previously used antidepressant medication or nortriptyline	Reoccurrence of PPD within 12 weeks Psychiatric examination	Significantly more women who elected monitoring alone (62.5%) suffered the recurrence of PPD compared to women who also received antidepressant medication (6.7%)	Small sample size Non-random group allocation Participants were not blinded to treatment Potential cofounder - anti-depressant use during pregnancy by several participants Follow-up only to 12 weeks
(Wisner, Perel et al., 2001)	RCT[2]	51 US women with a previous episode of PPD I = 26 mothers [3] C = 25 mothers	Immediate post-birth treatment of nortriptyline	Reoccurrence of PPD in the first 20 weeks postpartum HRSD and RDC	No significant group differences were found. Of the 26 women who took nortriptyline preventively, 6 suffered a recurrence of postpartum depression while of the 25 women who took placebo, 6 suffered recurrence.	Small sample size
		Interpersonal Psychotherapy				
(Zlotnick et al., 2001)	Pilot RCT	37 US pregnant women on public assistance who had at least 1 risk factor for postpartum depression I = 18 mothers C = 19 mothers	Four weekly 60-minute group sessions	PPD at 12 weeks BDI and structured clinical interview (SCID)	Significant group differences were found. 6 (33%) out of 18 women in control group developed PPD compared to none of the 17 women in the intervention group	Small sample size 50% of eligible women declined trial participation Inexplicit randomization process Atypical sample - 77% of participants were single Intervention provider unknown
(Gorman, 2001)	RCT Stratification based on previous history of major depression	45 US pregnant women at-risk for PPD I = 24 mothers C = 21 mothers	Five individual sessions, beginning in late pregnancy and ending at approximately 4 weeks postpartum	PPD at 4 and 24 weeks Structured clinical interview for DSM-III-R (SCID)	At 4 weeks postpartum, significantly more women in the control group met DSM-III-R criteria for major depression than women in the intervention group (25% vs. 0%, $\underline{p} = 0.02$). Effects were not maintained through 24 weeks postpartum.	Small sample size Inexplicit randomization process

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Cognitive Behavioural Therapy				
(Saisto et al., 2001)	RCT Random allocation using sealed envelopes Power analysis Intent-to-treat	176 Finnish pregnant women who had fear of childbirth I = 85 mothers C = 91 mothers	Intensive therapy (mean 3.8± 1.0 sessions with obstetrician and 1 session with midwife) vs. standard care (mean 2.0 sessions)	PPD at 12 weeks - BDI	No significant group differences were found related to PPD.	CBT intervention did not directly target PPD but rather fear of labour Statistical results related to PPD not reported
(Chabrol et al., 2002)	RCT Random allocation using alternate numbers	241 French women with EPDS screening score >8 I = 113 mothers C = 128 mothers	One cognitive behavioural session before hospital discharge provided by a 'therapist' (included psychology graduate students)	PPD at 4 to 6 weeks - EPDS	Significant group differences were found. 29 (29.8%) mothers in the intervention group and 55 (48.2%) mothers in the control group scored above 11 on the EPDS (χ^2 = 7.36, p = 0.007).	Weak randomization method A cut-off score of 8/9 rather than the recommended 9/10 was used to identify high-risk women and a cut-off score of 10/11 rather than the recommended 12/13 was used to assess for PPD
		Psychological Debriefing				
(Lavender & Walkinshaw, 1998)	RCT Random allocation using sealed envelopes Power analysis	120 primiparous UK women I = 60 mothers C = 60 mothers	1 midwifery-led debriefing session before hospital discharge	PPD at 3 weeks - HAD	Significant group differences were found. 5 (8.6%) women in the debriefing group had depressive symptoms in comparison to 31 (53.4%) women in the control group.	Premature timing of outcome assessment Weak measure of PPD Atypical population -59.6% were single mothers
(Small et al., 2000)	RCT Telephone randomization Power analysis Intent-to-treat	1041 Australian women who had an operative birth I = 520 mothers C =521 mothers	1 midwifery-led debriefing session before hospital discharge	PPD at 24 weeks - EPDS and SF-36	No significant group differences were found. 81 (17%) women allocated to debriefing scored as depressed at 24 weeks postpartum in comparison to 65 (14%) women allocated to usual postpartum care	No serious limitations
		Antenatal and Postnatal Classes				
(Gordon & Gordon, 1960)	Quasi-experimental	161 pregnant US women I = 85 mothers C =76 mothers	Two 40-minute antenatal classes, in addition to standard prenatal classes, focusing on social and psychological adjustment	PPD at 6 and 24 weeks Obstetrician evaluation using a 4-point scale	Significant group differences were found. Only 15 % of the women in the intervention group experienced emotional upset in comparison to 37% of the women in the control group.	Non-random group allocation Primary outcome defined as 'emotional upset' Participant details lacking Unstandardized measure of PPD High attrition at 24 week follow-up

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
(Stamp et al., 1995)	RCT Random allocation using sealed envelopes Power analysis Parity stratification Intent-to-treat	144 'vulnerable' pregnant Australian women (Modified antenatal screening questionnaire) I = 73 mothers C = 71 mothers	Three midwifery-led group sessions (2 antenatally and 1 postnatally at 6 weeks)	PPD at 6, 12, and 24 weeks - EPDS	No significant group differences were found.	High number of mothers screened vulnerable Only 31% of women attended all 3 sessions
(Brugha et al., 2000)	RCT Computer randomization Power analysis Intent-to-treat	209 high-risk pregnant UK women (researcher developed screening tool) I = 103 mothers C = 106 mothers	'Preparing for Parenthood' - 6 structured 2-hour weekly antenatal classes and 1 postnatal class provided by trained nurse and occupational therapist	PPD at 12 weeks -EPDS and GHQ-O, and Clinical interview (SCAN)	No significant group differences were found.	Only 45% of women attended sufficient sessions to potentially benefit
(Elliott et al., 2000)	Quasi-experimental Allocation based on expected delivery date Intent-to-treat	99 'vulnerable' pregnant UK women (Leverton Questionnaire or Crown Crisp Experiential Index) I = 47 mothers C = 52 mothers	"Preparation for Parenthood' - 11 monthly meetings (5 antenatally and 6 postnatally) conducted by a psychologist and health visitor	PPD at 12 weeks - EPDS	Significant group differences for primiparous women favouring the intervention group. Unsuccessful for 'second-time' women.	Non-random group allocation Significant differences between participating and non-participating eligible women Low-vulnerable mothers invited to groups to provide viable group sizes Low group attendance (36%) for multiparous mothers Study conducted between 1984 to1985
(Buist et al., 1999)	Pilot RCT -Random allocation	44 'at-risk' primiparous Australian women (researcher developed screening tool) I = 23 mothers C = 21 mothers	10 structured classes (8 antenatally and 2 postnatally) facilitated by a midwife and either a psychologist or nurse focusing on parenting and coping	PPD at 6 and 24 weeks -EPDS and BDI	No significant group differences were found. Mean EPDS scores at 6 and 24 weeks for women in the intervention group were 7.40 and 7.57 respectively versus 9.06 and 8.09 for women in the control group.	Small sample size Inexplicit randomization process Significant group differences in baseline characteristics Unreported class attendance rate Poor screening tool – at no time did any participant score above 12 on the EPDS

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Intrapartum Support				
(Wolman et al., 1993) (Nikodem et al., 1998)	RCT Random allocation using sealed envelopes	189 nulliparous South African women I = 92 mothers C = 97 mothers A further 73 mothers recruited later	Additional companionship from 1 of 3 volunteer labour companions recruited from the community - a minimum of five hours of support	PPD at 6 weeks Pitt Depression Inventory PPD at 52 weeks- EPDS	Significant group differences were found at 6 weeks (mothers receiving the supportive intervention had lower mean depression scores [M = 10.4] than mothers in the control group [M = 23.3]) but not 52 weeks.	Poor measure of PPD at 6 weeks High attrition at 52 week follow-up Change is study protocol before completion
(Gordon et al., 1999)	RCT Random allocation using sealed envelopes	314 nulliparous US women delivering in 1 of 3 HMO-managed hospitals I = 149 mothers C = 165 mothers	Provision of labour support from a trained doula	PPD at 4 to 6 weeks Mental health index of SF-36 (5 items)	No significant group differences were found.	High number of women in both groups excluded after randomization Weak measure of PPD Statistical results related to PPD not reported
(Hodnett et al., 2002)	RCT Computer randomization Power analysis Intent-to-treat	6915 Canadian and US women I = 3454 mothers C = 3461 mothers	Continuous labour support by a specially trained nurse for a minimum of 80% of the time from randomization to delivery	PPD at 6 to 8 weeks EPDS	No significant group differences were found. 245 (8.7%) women in the continuous labour support group had EPDS scores above 12 in comparison to 277 (10.1%) women in the usual care group.	No serious methodological limitations
		Supportive Interactions				
(Armstrong et al., 1999, 2000)	RCT Random allocation by computer-generated numbers Power analysis	181 Australian families where the child was at a greater risk of poor health and developmental outcomes I = 90 mothers C = 91 mothers	Extensive nursing home visits (weekly to 6 weeks, fortnightly to 12 weeks, and monthly to 24 weeks)	PPD at 6 and 16 weeks EPDS	Significant group differences in EPDS mean scores were found at 6 weeks favouring the intervention group but not 16 weeks.	Only 63% of mothers completed pre-trial screening questionnaire Significant group differences in baseline characteristics

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
(Emond et al., 2002)	Retrospective/ prospective cohort	Retrospective data on 2113 UK families; prospective data on 459 primiparous women and their children	Women in the prospective group were visited by health visitors at home antenatally (in third trimester), at the statutory primary birth visit, at 3 weeks postpartum, and then every 5 weeks until the infant was 8 months old; approximately 20% of women continued receive visits until 2 years of age.	PPD at 6 weeks and at 1 and 2 years EPDS	Significantly more women in the prospective group scored 'at least' 12 on the EPDS in the antenatal period (37% vs. 30%). These differences were still apparent at 6 weeks (25% vs. 19%) and at 1 year (14% vs. 9%). At 2 years there was no difference between the groups (17% vs. 16%).	Non-random group allocation Group differences in baseline EPDS scores Significant demographic differences between women who agreed to participate and those who refused
(Morrell et al., 2000)	RCT Random allocation using sealed envelopes Power analysis Intent-to-treat	623 UK women I = 311 mothers C = 312 mothers	Up to 10 home visits in the first postpartum month of up to 3 hours duration by a trained community postnatal support worker	PPD at 6 and 24 weeks EPDS	At 6 weeks postpartum, there was a significant difference in EPDS scores favouring the *control* group and no difference at 24 weeks.	No serious methodological limitations but theoretically weak in relation to the prevention of PPD
(Reid et al., 2002)	RCT Computer randomization Power analysis Intent-to-treat	1004 primiparous UK women I = 753 mothers (2 different intervention groups) C = 251 mothers	2 interventions: (1) an invitation to a local postpartum support group run weekly by a trained midwife facilitator and (2) postpartum support manual mailed at 2 weeks postpartum	PPD at 12 and 24 weeks EPDS	There were no significant differences in EPDS scores between the control and intervention groups at 12 and 24 weeks either with the proportion scoring above 11 or for mean EPDS scores.	A significant number of women randomized to the support group did not attend SES bias in group attendees- more 'middle' than 'working' class mothers attended the groups Researchers question the practice of recruiting women antenatally for a postpartum intervention
		Continuity of Care				
(Shields et al., 1997)	RCT Random allocation Intent-to-treat	1299 pregnant UK women who had no adverse characteristics I = 648 mothers C = 651 mothers	Total midwife care – midwife aimed to provide the majority of planned care throughout the antenatal, intrapartum, and postpartum period. Women also had an opportunity to discuss their feelings in a formal debriefing session during the last postpartum visit	PPD at 7 weeks EPDS	Women in the midwifery-managed group had significantly lower EPDS scores ($\underline{M}$ = 8.1, $\underline{SD}$ = 4.9) in comparison to mothers in the shared care group ($\underline{M}$ = 9.0, $\underline{SD}$ = 4.9) However, non-significant group differences were found in relation to EPDS scores above 12 (16.7% vs. 23.2%).	Inexplicit randomization process A 9-item EPDS was used instead of the psychometrically tested 10-item EPDS Participants in the intervention group were more likely to return the postal questionnaires

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
(Waldenstrom et al., 2000)	RCT Random allocation using sealed envelopes Intent-to-treat	1000 low-risk Australian women in early pregnancy I = 495 mothers C = 505 mothers	Team midwifery care	PPD at 8 weeks EPDS	No significant group differences were found in relation to depressive symptomatology as 16% of women in the team care group and 12% in the standard care group exhibited EPDS scores above 12.	Demographic differences between questionnaire responders and non-responders
		Early Postpartum Follow-Up				
(Serwint et al., 1991)	Quasi-experimental Group allocation based on 2-week period	251 healthy US women I = 129 mothers C = 122 mothers	'Early communication': Routine postpartum care plus (1) visit 24-36 hours after delivery from infant's future care provider, (2) special 24-hour telephone access to a physician via a pager for 8 weeks, (3) physician initiated telephone call 2-3 days post discharge to answer questions	PPD at 8 weeks CES-D	No significant group differences were found. Women who received the intervention had similar CES-D scores (M = 11.54) as women in the control group (M = 13.65) with 29% scoring above 16 on the CES-D in comparison to 39% of women in the control group.	Poor randomization method Weak measure of PPD
(Gunn et al., 1998)	RCT Telephone randomization Power analysis Intent-to-treat	683 healthy Australian women	All participants received a letter and appointment date to see a general practitioner for a check-up: the intervention group for 1 week after hospital discharge, the control group for 6 weeks postpartum.	PPD at 12 and 24 weeks EPDS	No significant group difference between the percentages of women scoring above 12 on the EPDS at 12 (16.6% vs. 13.6%) or 24 (11.6% vs. 12.8%) weeks.	Number of mothers randomized initially to the control and intervention groups was not reported
		Home versus Clinic Follow-up				
(Lieu et al., 2000)	RCT Random allocation using sealed envelopes	1163 medically and socially low-risk US women discharged home within 48 hours I = 580 mothers C = 583 mothers	Home visit by trained nurse (60 minutes long and included a maternal physical assessment and home preventive counselling) versus paediatric clinic visit by nurse practitioner or physician on the third or fourth day postpartum	PPD at 2 weeks CES-D	No significant differences in CES-D scores (cut-off 16) were found at the 2-week interview (intervention group n = 126, 22% vs. control group n = 123, 21%).	Only 54% of mothers eligible for trial participation Premature timing of outcome assessment Weak measure of PPD

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Flexible Postpartum Care				
(MacArthur et al., 2002)	RCT Computer randomization Power analysis Intent-to-treat	2064 UK women Only women expected to move out of the general practice were excluded I = 1087 mothers C = 977 mothers	Midwifery care with no routine contact with general practitioners that was extended to 12 weeks postpartum and incorporated the use of symptom checklist and the EPDS to identify health needs and guidelines for the management of these needs	PPD at 16 weeks EPDS	Women's EPDS scores were significantly lower in the intervention group than in the control group (OR = 0.57, 95% CI = 0.43 - 0.76) with 14.4% of mothers in the intervention group scoring above 12 on the EPDS in comparison to 21.3% of mothers in the control group (p = 0.01).	No serious limitations
		Oestrogen Therapy				
(Sichel et al., 1995)	Open-label single group	7 US women with histories of postpartum psychosis and 4 women with histories of PPD	High-dose oral Premarin daily in decreasing dosages over 4 weeks	PPD at 1, 3, 6, 12 months Clinical interview	All but one participant remained non-depressive and required no treatment with psychotropic medications during the 1-year follow-up period.	Small sample size Lack of a control group Participants were not blinded to treatment
		Progesterone Therapy				
(Lawrie, Hofmeyr, De Jager et al., 1998)	RCT Block randomization using a random numbers table Double blinding Power analysis Intent-to-treat	180 South African postpartum women using a non-hormonal method of contraception I = 90 mothers C = 90 mothers	Single dose of norethisterone enanthate 200mg (1 ml) by intramuscular injection at 48 hours postpartum	PPD at 1, 6, 12 weeks EPDS and MADRS	In comparison to the placebo group, women receiving the progestogen injection were at a significantly greater risk of developing depressive symptomatology by 6 weeks postpartum.	Less than 25% trial participation rate
		Thyroid Function				
(Harris et al., 2002)	RCT Random allocation by computer-generated numbers Double blinding	446 UK thyroid-antibody-positive women	100 microg of thyroxine given daily from 6 to 24 weeks postpartum	PPD at 6, 12, 16, 20 and 24 weeks EPDS, MADRS, and GHQ	No significant group difference in rates of depression at any assessment point	Number of mothers randomized initially to the control and intervention groups was not reported Analysis based only on compliant participants (342 out of 446)

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Educational Strategies				
(Hayes et al., 2001)	RCT Random allocation by computer-generated numbers Power analysis	206 Australian primiparous women who were between 28 to 36 week pregnant I = 103 mothers C = 103 mothers	Educational package that consisted of in information booklet, audio-tape of one woman's story of PPD, and an experienced midwife to review the package	PPD at 8 to12 and 16 to24 weeks POMS	No significant group difference was found on the depression subscale between the two groups. Median scores for both the intervention and control groups ranged from 4.0 to 5.0 at all time periods ($\underline{p} > 0.05$).	Weak measure of PPD Follow-up assessment completed by an unblinded research assistant
(Okano et al., 1998)	Descriptive study 2 groups	40 Japanese women who consulted a psychiatrist for postpartum depression; 18 mothers had attended a PPD class prenatally	One 'Mother's class' in late pregnancy to provide information about the PPD, including preventive suggestions. Mothers were encouraged to obtain early psychiatric contact and resource information was provided.	Time of first psychiatric contact and interval between onset of illness and first interview.	The number of women with major PPD (SADS) was significantly higher in the non-attendant group than that in the attendant group. Mother who attended the group initiated contact with psychiatric services sooner than non-attending mothers.	Small sample size Retrospective design
		Relaxation with Guided Imagery				
(Rees, 1995)	RCT Random allocation	60 US primiparous women I = 30 mothers C = 30 mothers	Every morning for a 4-week period women followed a tape-recorded relaxation with guided imagery protocol for 15 minutes	PPD at 4 weeks CES-D	Significant group differences were found. Mothers who received the intervention had less depressive symptomatology at 4 weeks postpartum than mothers in the control group ($\underline{M} = 1.37$, $\underline{SD} = 0.32$ vs. $\underline{M} = 1.64$, $\underline{SD} = 0.53$).	Small sample size Inexplicit randomization and study procedures Weak measure of PPD

[1] PPD = postpartum depression; [2] RCT = randomized controlled trial; [3] I = intervention group and C = control group

Implications for Practice, Policy, and Research

The long-term consequences of postpartum depression suggest preventive approaches are warranted. Manipulation of a risk factor may improve the associated likelihood of developing postpartum depression through many different ways. The most obvious is to decrease the amount of exposure to a given risk factor or, alternatively, reduce the strength or mechanism of the relationship between the risk factor and postpartum depression (McLennan & Offord, 2002). However, translating risk factor research into predictive screening protocols and preventive interventions has met with limited success, as complex interactions of biopsychosocial risk factors with individual variations need to be contemplated. Over 30 studies have been examined in this review with the diverse aetiology of postpartum depression reflected in the broad range of approaches considered. Although theoretical justifications for many of these approaches have been presented, methodological limitations render intervention efficacy equivocal with scant evidence available to guide practice or policy recommendations (Table 2-4). Despite the recent upsurge of interest in this area, many questions remain unanswered resulting in a myriad of research implications.

Only two small US studies have evaluated the efficacy of prophylactic antidepressant medication (nortriptyline) and it is unknown whether the conflicting results are related to methodological limitations, inadequate drug mechanism, or intervention/approach ineffectiveness. Due to the poor quality of evidence, the effect of pharmacological interventions in the prevention of postpartum depression is unclear and this approach cannot be recommended for clinical practice. It is noteworthy that another small double-blind randomized controlled trial evaluating the effect of sertraline on the prevention of postpartum depression among 22 US mothers who had suffered one previous episode of postpartum depression was recently completed (K. Wisner et al., 2002). The results from this unpublished study suggest that sertraline may provide preventive effect. However, well-conducted randomized controlled trials are needed and should include sample sizes based on power analyses and interventions that evaluate commercially available antidepressants from diverse drug categories.

Similarly from a biological orientation, the effectiveness of hormonal interventions in the prevention of postpartum depression also needs to be rigorously examined in well-conducted randomized controlled trials. Research efforts should expand to investigations that examine women's hormonal levels across the perinatal period from pregnancy until the resumption of normal menstrual cycles in order to delineate the potential effects of hormonal changes on depression and relapse risk. Currently, the neurochemical mechanism preventing affective relapse in high-risk women is only hypothesized and future research is necessary to clarify the role of prophylactic agents. It is noteworthy that one well-designed trial suggested synthetic progestogens increased the risk of developing depressive symptomatology (Lawrie, Hofmeyr, De Jager et al., 1998). As such, there is fair evidence to support the recommendation that long-acting progestogen contraceptives should probably not be given in the postpartum period (Lawrie, Herxheimer, & Dalton, 2000).

Several psychological interventions hold promise in the prevention of postpartum depression. Two small studies involving interpersonal psychotherapy have produced short-term positive results and provide preliminary evidence to suggest that this preventive strategy may have a positive effect on maternal mood. As such, there is a continuing need to rigorously evaluate the efficacy of this preventive strategy with future studies incorporating evaluations of maternal acceptability and the long-term effects of therapeutic gains. Also within this preventive approach is cognitive behavioural therapy, a strategy that has received limited attention in its preventive effect and further research specific to postpartum depression is recommended. Conversely, two trials evaluating the effect of psychological debriefing appear to provide beginning evidence to guide practice recommendations. While one UK study demonstrated a positive outcome, methodological weaknesses severely limit the results (Lavender & Walkinshaw, 1998). Due to the evidence obtained from a large well-designed randomized controlled trial (Small, Lumley, & Donohue, 2001), there is fair evidence to suggest that psychological debriefing in the immediate postpartum period has no protective effect on maternal mood and it is recommended that this strategy should not be implemented into practice. It is noteworthy that an unpublished trial incorporating 1745 healthy Australian mothers also found debriefing to be ineffective in reducing psychological problems in the first year after delivery (Priest et al., 2002), providing further evidence for this practice recommendation.

In general, the effectiveness of psychosocial approaches has not been satisfactorily demonstrated and well-designed studies with larger samples are required. Specifically, antenatal classes focusing on postpartum depression have repeatedly been shown to have little preventive effect. This finding may be due to methodological limitations, such as inadequate sample sizes, unrealistic effect sizes or no formal justification for sample size, large rates of participant decline and/or intervention attrition rates, or lack of adequate antenatal screening tools for identification of those “at-risk” leading to the targeting of heterogeneous “at risk” samples. Currently, there is little evidence to support the use of antenatal group interventions in heterogeneous samples of women “at-risk” for postpartum depression. However, research into structured interventions in homogeneous, symptomatic women is required; this would incorporate using an “indicated” rather than a “targeted” approach. These studies should address the previous methodological limitations and examine the efficacy for both antenatal symptoms as well as the prevention of postpartum depression. This research should be conducted before concluding that antenatal interventions have no place in the prevention of postpartum depression. It is noteworthy that poor group attendance was reported in several trials. This is a clinically significant finding noticeably demonstrating participant preference and intervention acceptance. Future research protocols would do well to take heed of this key finding.

Several studies have been found evaluating the effect of labour support, provided by both nurses and doulas. While postpartum depression was the primary outcome for only one study (Wolman et al., 1993), the trial by Hodnett et al., (2002) had sufficient power to detect the protective effect of continuous labour

support and no significant group differences were found in the prevalence of depressive symptomatology. The results from this well-conducted trial provide good evidence to recommend that continuous labour support should not be considered as a preventive strategy for postpartum depression. Conversely, the importance of support *postnatally* is unknown. While one well-designed trial (Armstrong et al., 1999, 2000) with minor limitations suggested intensive nursing home visits had a beneficial effect in the first 6 weeks postpartum, the protective effect was not maintained to 16 weeks. It is interesting to note that the 16-week assessment coincided with a decrease in intervention intensity from weekly to monthly visits. A methodologically weaker cohort study also demonstrated no long-term positive effect of nursing home visits (Emond et al., 2002). Clearly, further research is warranted to examine the effectiveness of nursing home visits in the prevention of postpartum depression; the context of these visits should also be analyzed.

The importance of lay support also remains equivocal. In a well-designed randomized controlled trial, Morrell and colleagues (2002) demonstrated that the addition of home visits by a community support worker had no protective effect on postpartum depression. However, a review of the intervention activities revealed that the lay workers spent over 75% of their time providing instrumental support, such as housework and infant care, and minimal time providing emotional and appraisal (feedback) support. Methodologically strong, this trial was theoretically weak in relation to the prevention of postpartum depression. Due to the multidimensional nature of supportive interactions, the potential to positively influence health outcomes depends on the formulation of specific predictions as to which supportive functions will be the most effective for a particular type of stressor (Will & Shinar, 2000). In qualitative studies, women from diverse cultures who have suffered from postpartum depression consistently describe their feelings of loneliness, worries about maternal competence, role conflicts, and inability to cope (Chen, Wu, Tseng, Chou, & Wang, 1999; Nahas, Hillege, & Amasheh, 1999; Ritter et al., 2000; Small et al., 1994); instrumental support was not consequential. As such, it is not surprising that this trial did not have a protective effect in the prevention of postpartum depression.

Consistent with the lay support model, postpartum support groups have been hypothesized to prevent postpartum depression. However, similar to antenatal classes, postpartum group attendance rates are a clear problem as demonstrated by Reid et al. (2002). Furthermore, these researchers found a socio-economic bias in-group attendees, as "'working class" mothers were less likely to attend group sessions. Theoretically, group sessions make sense due to the sharing of one's experiences with similar others and the provision of peer support (i.e., mother-to-mother). Research suggests that this sharing interaction with a peer: (1) promotes social comparisons that normalize and validate experiences, enhances self-esteem and understanding, and reduces deviance: (2) provides reciprocal exchanges among equals that encourage a sense of belonging, worth, and control; (3) increases self-efficacy and one's perceived ability to perform certain tasks or behaviours; and (4) enhances coping and adaptive behaviours through the discussion of problem-

solving techniques, coping strategies, and counter responses (Cohen, Underwood, & Gottlieb, 2002; Dennis, in press-b). Well-designed trials are still needed to evaluate the effect of postpartum group interventions that incorporate homogeneous samples and outcomes sensitive to peer support interventions. To assist in determining sensitive outcomes and *why* peer support may have a positive effect on health outcomes, the Peer Support Evaluation Inventory has been recently developed (Dennis, 2003). Throughout this review, what has become clear is that group sessions, while theoretically sound, have significant barriers to utilization. Future investigations are needed to evaluate the provision of support through different modes such as computers and the telephone.

Improving the quality of care provided to women has been another postpartum depression preventive approach. Two trials have evaluated the effect of early postpartum follow-up. While one study had several methodological limitations (Serwint et al., 1991), another well-designed trial has clearly shown no beneficial effect on maternal mental health outcomes (Gunn et al., 1998). As such, there is fair evidence to suggest that early postpartum follow-up has no preventive effect on postpartum depression and should not be recommended for clinical practice. Similarly, two large trials have evaluated the effect of midwifery-based continuity of care models on diverse maternal outcomes, including postpartum depression, and no significant group differences were found (Shields et al., 1997; Waldenstrom et al., 2000). However, results from a large, randomized controlled trial showed that flexible, individualized midwifery-based postpartum care that incorporated postpartum depression screening tools did have a positive effect in the prevention of postpartum depression (MacArthur et al., 2002). This intervention appears to be promising and a well-designed trial conducted within a North American context is needed to replicate these results.

Finally, the effect of educational strategies on prevention of postpartum depression is unknown. While an educational package informing women about postpartum depression was ineffective (Hayes et al., 2001), informing mothers about health service availability did assist mothers in seeking appropriate treatment sooner (Okano et al., 1998). This is a significant finding that warrants further investigation even though the intervention did not prevent postpartum depression, as lacking knowledge related to health service availability is an important help-seeking barrier in the detection and management of postpartum depression.

While this review clearly demonstrates that no specific approach can be strongly recommended for clinical practice, many specific research implications have been highlighted. To be most efficient in conducting this research there continues to be a need for further interdisciplinary networking among investigators with complementary research interests. For example, psychosocial intervention researchers could collaborate with health services researchers to develop and test multi-level intervention approaches embedded in service systems. To further address postpartum depression as a public health problem, the inclusion of ethnically and socio-economically diverse women in these research efforts is critical to examining the differences in depression symptoms, response rate to interventions, and health service use.

It is also necessary to present a few general comments regarding the development of preventive programs. Similar to screening initiatives, preventive interventions should be relatively simple and inexpensive. This is critical if the intervention is to be applied to a relatively large population; unless a project is feasible on a large scale, there is little utility in pursuing smaller demonstration projects. Furthermore, the risk of negative outcomes from a prevention intervention is a frequently ignored possibility. Although adverse effects are primarily thought of in treatment contexts, particularly pharmacological trials, prevention interventions also include the possibility of unfavourable events. For example, targeted prevention trials carry the risk of labelling and stigmatizing participants. Although these risks might be tolerable for those who are accurately identified and who benefit from the intervention, it may not be for those who were included in the intervention as false positives or who do not benefit from the intervention (McLennan & Offord, 2002). In addition, an increased rate of anxiety for mothers may be of real consequence, as a link between postpartum depression and child health outcomes has been demonstrated. While emphasising this may increase a mother's willingness to accept a preventive intervention, it might also augment the mother's level of anxiety or guilt if she perceives personal responsibility for placing her child at risk for a poor outcome, particularly if she is suffering from the cognitive distortions of depression that foster excessive guilt feelings (McLennan & Offord, 2002).

Finally, the preventive intervention should be acceptable to key stakeholders. This aspect should be considered because it is anticipated that the preventive program will be widely accepted and implemented, if it is ultimately demonstrated to be effective. Numerous stakeholders may potentially be involved in determining whether a program will obtain successful implementation. Stakeholders to consider include the general population (e.g., willingness to support the program through taxation), women (e.g., willingness to be screened and subsequently to accept the preventive program if screened positive), health professionals and administrators (e.g., willingness to devote priority to this intervention over others), and politicians (e.g., consistency of the program with their philosophy, minimal level of controversy, and potential political payoffs) (McLennan & Offord, 2002). As stakeholders can play a pivotal role in the success of a preventive program, further research should be conducted to look at this often forgotten aspect in postpartum depression research.

Table 2-4. Summary Quality of Evidence and Practice Recommendations for Preventive Interventions

Intervention Strategy		Study	Research Design Rating[1]	Quality Rating[2]	Classification of Recommendation[3]
Pharmacological	*Antidepressant Medication*	(Wisner & Wheeler, 1994)	Quasi-experimental: II-1	Poor	I
		(Wisner, Perel et al., 2001)	RCT: I	Fair	
Psychological	*Interpersonal Psychotherapy*	(Zlotnick et al., 2001)	Pilot RCT: I	Poor	I
		(Gorman, 2001)	RCT: I	Poor	
	Cognitive Behavioural Therapy	(Saisto et al., 2001)	RCT: I	Fair	I
		(Chabrol et al., 2002)	RCT: I	Poor	
	Psychological Debriefing	(Lavender & Walkinshaw, 1998)	RCT: I	Poor	D
		(Small et al., 2000)	RCT: I	Good	
Psychosocial	*Antenatal Classes*	(Gordon & Gordon, 1960)	Quasi-experimental: II-1	Poor	I
		(Stamp et al., 1995)	RCT: I	Fair	
		(Brugha et al., 2000)	RCT: I	Fair	
		(Elliott et al., 2000)	Quasi-experimental: II-1	Poor	
		(Buist et al., 1999)	Pilot RCT: I	Poor	
	Intrapartum Support	(Wolman et al., 1993) (Nikodem et al., 1998)	RCT: I	Poor	D
		(Gordon et al., 1999)	RCT: I	Poor	
		(Hodnett et al., 2002)	RCT: I	Good	
	Supportive Interactions	(Armstrong et al., 1999, 2000)	RCT: I	Fair	I
		(Emond et al., 2002)	Cohort: II-2	Poor	
		(Morrell et al., 2000)	RCT: I	Good	
		(Reid et al., 2002)	RCT: I	Fair	
Quality Improvement	*Continuity of Care*	(Shields et al., 1997)	RCT: I	Fair	D
		(Waldenstrom et al., 2000)	RCT: I	Good	
	Early Postpartum Follow-Up by General Practitioners	(Serwint et al., 1991)	Quasi-experimental: II-1	Poor	D
		(Gunn et al., 1998)	RCT: I	Good	
	Home vs. Clinic Visit	(Lieu et al., 2000)	RCT: I	Poor	I
	Flexible Postpartum Care	(MacArthur et al., 2002)	RCT: I	Good	B

Hormonal	*Oestrogen Therapy*	(Sichel et al., 1995)	Descriptive: III	Poor	I
	Progesterone Therapy	(Lawrie et al., 1998)	RCT: I	Fair	D
	Thyroid Function	(Harris et al., 2002)	RCT: I	Fair	I
Other	*Educational Strategies*	(Hayes et al., 2001)	RCT: I	Poor	I
		(Okano et al., 1998)	Descriptive: III	Poor	
	Relaxation with Guided Imagery	(Rees, 1995)	RCT: I	Poor	I

[1] I = evidence from randomized controlled trial(s); II-1 = evidence from controlled trial(s) without randomization; II-2 = evidence from cohort or case-control analytic studies, preferably from more than one centre or research group; II-3 = evidence from comparisons between times or places with or without the intervention, dramatic results in uncontrolled experiments could be included here; III = opinion of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.

[2] Good = a study (including meta-analyses or systematic reviews) that meets all design-specific criteria well; Fair = a study (including meta-analyses or systematic reviews) that does not meet (or it is not clear that it meets) at least one design-specific criterion but has no known "fatal flaw"; Poor = a study (including meta-analyses or systematic reviews) that has at least one design-specific "fatal flaw", or an accumulation of lesser flaws to the extent that the results of the study are not deemed able to inform recommendation.

[3] A = there is good evidence to recommend this approach; B = there is fair evidence to recommend this approach; C = the existing evidence is conflicting and does not allow making a recommendation for or against use of this approach, however other factors may influence decision-making; D = there is fair evidence to recommend against this approach; E = there is good evidence to recommend against this approach; I = there is insufficient evidence (in quantity and/or quality) to make a recommendation, however other factors may influence decision-making.

Section III: Treatment of Postpartum Depression

There is limited published research regarding the effectiveness of treatment for postpartum depression with approaches including pharmacological, psychological, psychosocial, hormonal, and other diverse strategies. What is unequivocal is that treating postpartum depression is a challenging undertaking that requires specific knowledge and expertise. This section is based on a literature review for each of the main treatment approaches.

Pharmacological Interventions

Antidepressant Medication

There are over 20 antidepressant medications commercially available in Canada today (Table 5) with this number expecting to increase in upcoming years (Remick, 2002). Selective Serotonin Reuptake Inhibitors (SSRIs) are newer-generation drugs that have been recommended by several researchers as the initial choice of treatment for postpartum depression (Marcus, Barry, Flynn, Tandon, & Greden, 2001; Nonacs & Cohen, 2002; Wisner, Parry, & Piontek, 2002). The literature on the use of these drugs in new mothers, especially those breastfeeding, has been rapidly expanding in recent years. However, only four studies have been found evaluating the effect of antidepressant medication specifically on postpartum depression, with three incorporating the use of SSRIs. Of these studies only one (Appleby, Warner, Whitton, & Faragher, 1997) was included in a Cochrane systematic review evaluating the effect of antidepressant drug treatment for postnatal depression (Hoffbrand, Howard, & Crawley, 2001). The purpose of this randomized controlled trial was to assess the clinical efficacy of fluoxetine, combined with at least one session of counselling in postpartum women, and included four treatment cells: fluoxetine or placebo plus one or six sessions of counselling (Appleby et al., 1997). The counselling was derived from cognitive behavioural therapy and while designed to be delivered by non-specialists after brief training, in this trial a psychologist with no previous clinical experience provided the 30 minute to 1-hour counselling sessions. Eighty-seven women who satisfied research diagnostic criteria for major ($\underline{n}$ = 51) and minor ($\underline{n}$ = 36) depression at 6 to 8 weeks postpartum participated with 61 (70%) completing the 12 weeks of treatment. Depressive symptomatology was assessed at 1, 4, and 12 weeks of treatment using the EPDS, Hamilton Rating Scale for Depression (HRSD), and a revised clinical interview. While highly significant improvements were seen in all four treatment groups, the progress in mothers receiving fluoxetine was significantly greater than in those receiving the placebo, and six sessions of counselling had a significantly greater effect than one single session. These differences were evident after 1 week, and improvement in all groups was complete after 4 weeks. The interaction between counselling and fluoxetine was not statistically significant. While it appears that both fluoxetine and cognitive-behavioural counselling are effective treatments for postpartum

depression, it should be noted that of the 188 confirmed cases of postpartum depression, 101 women refused trial participation primarily due to a reluctance to take antidepressant medication. The generalizability of the results is further limited due to differences in maternal characteristics between those who completed the trial and those who discontinued.

To determine the effectiveness of another SSRI, sertraline, in the treatment of women with depressive symptomatology that developed within 24 weeks postpartum, an 8-week, open-labelled trial was conducted (Stowe, Casarella, Landry, & Nemeroff, 1995). Twenty-six US women who fulfilled DSM-III-R criteria for major depression were treated with sertraline using an initial dose of 50mg/day, which was adjusted according to side effects and depression severity, to a maximum dose of 200mg/day. Biweekly assessments were conducted including clinical interviews (SIGH-D) and self-rated depression measures (EPDS and BDI). Twenty-one women (81%) completed the 8-week study with 20 exhibiting a salutary response as defined by a greater than 50% reduction in SIGH-D baseline scores; 14 women demonstrated complete symptom remission. While the results indicate that sertraline may be an efficacious treatment for women with postpartum depression, limitations such a small sample size, open-label single group design, homogeneous sample, and the possibility of a co-intervention (women were concurrently provided with support) render it impossible to determine whether the findings are due to the medication, psychosocial support, or both.

The effect of yet another SSRI, fluvoxamine, was evaluated in an 8-week, open-label US trial. Six women at 8 weeks postpartum identified with depressive symptomatology using the EPDS and Hamilton Rating Scale for Depression (HRSD) began fluvoxamine treatment, 50mg/day titrated to 150mg/day, and were followed with weekly clinical interviews and administration of the HRSD by a blinded assessor (Suri, Burt, Altshuler, Zuckerbrow-Miller, & Fairbanks, 2001). Repeated measures analysis of variance indicated a significant decline in depression scores over time with the greatest degree of improvement occurring between the second and third week. Like the previous study, these findings are severely limited by the small sample size, open-label single group design, and lack of a placebo control group.

Finally, an 8-week, flexible-dose, open-label study of venlafaxine (immediate release; $\underline{M}$ dose = 162.5 mg/day) was performed in a group of 15 US women who met DSM-III-R criteria for major depression with onset within the first 12 weeks postpartum (Cohen et al., 2001). Mothers were assessed at baseline and every 2 weeks across the study using the 17-item Hamilton Rating Scale for Depression (HRSD). Despite high baseline scores, treatment response was robust; 12 of the 15 women experienced remission of major depression (HRSD score below 8). These findings have the usual limitations of a small sample size, open-label single group design, and lack of a placebo control group and suggest further research evaluating the effectiveness of venlafaxine is warranted.

While these studies suggest antidepressant medication may be effective in treating postpartum depression, it is noteworthy that Hendrick and colleagues suggest women with postpartum depression may

be significantly more likely than non-postpartum women to present with anxious features, take longer to respond to pharmacotherapy, and require more antidepressant medication to obtain a therapeutic response (Hendrick, Altshuler, Strouse, & Grosser, 2000).

Antidepressant risks also exist in the postpartum period as breastfeeding provides a medium for direct infant exposure. No controlled studies of antidepressant medication during breastfeeding exist. While it is beyond the scope of this chapter to review all the different studies assessing the effects of antidepressant medication in pregnant and breastfeeding women, Table 2-5 provides a comprehensive list of studies related to foetal/infant outcomes and breastfeeding. In addition, a myriad of reviews have been published to provide further assistance (Altshuler et al., 2001; Arnon, Shechtman, & Ornoy, 2000; Chisholm & Kuller, 1997; Epperson et al., 2001; Iqbal, Sobhan, & Ryals, 2002; Llewellyn & Stowe, 1998; Marcus et al., 2001; McElhatton, 1994; Misri, Kostaras, & Kostaras, 2000; Misri & Kostaras, 2002; Newport, Hostetter, Arnold, & Stowe, 2002; Newport, Wilcox, & Stowe, 2001; Nonacs & Cohen, 1998, 2002; Stewart, 2001; Ward & Zamorski, 2002; Wisner, Gelenberg, Leonard, Zarin, & Frank, 1999; K. L. Wisner et al., 2002; Wisner, Perel, & Findling, 1996; Yoshida, Smith, & Kumar, 1999).

Table 2-5. References Related to Commercially Available Antidepressant Use during Pregnancy or Breastfeeding

Category	Medication	Brand Name	Reference
Tricyclic Antidepressant (TCAs)	Amitriptyline	Elavil	(Bader & Newman, 1980; Breyer-Pfaff, Nill, Entenmann, & Gaertner, 1995; Brixen-Rasmussen, Halgrener, & Jorgensen, 1982; Pittard & O'Neal, 1986)
	Clomipramine	Anafranil	(Schimmell, Katz, Shaag, Pastuszak, & Koren, 1991)
	Desipramine	Norpramin	(Sovner & Orsulak, 1979; Stancer & Reed, 1986)
	Doxepin	Sinequan	(Frey, Scheidt, & von Brenndorff, 1999; Kemp, Ilett, Booth, & Hackett, 1985)
	Imipramine	Tofranil	(Ware & DeVane, 1990; Weinstock, Cohen, Bailey, Blatman, & Rosenbaum, 2001)
	Nortriptyline	Pamelor	(Altshuler, Burt, McMullen, & Hendrick, 1995; Brixen-Rasmussen et al., 1982; Matheson & Skjaeraasen, 1988; Wisner & Perel, 1991; Wisner, Perel, Findling, & Hinnes, 1997)
	Protriptyline	Triptil	—
	Trimipramine	Surmontil	—
Selective Serotonin Reuptake Inhibitors (SSRIs)	Citalopram	Celexa	(Heikkinen, Ekblad, Kero, Ekblad, & Laine, 2002; Rampono et al., 2000; Schmidt, Olesen, & Jensen, 2000; Spigset, Carieborg, Ohman, & Norstrom, 1997)
	Fluoxetine	Prozac	(Brent & Wisner, 1998; Burch & Wells, 1992; Chambers et al., 1999; Cohen et al., 2000; Goldstein, Corbin, & Sundell, 1997; Hale, Shum, & Grossberg, 2001; Hendrick, Stowe et al., 2001; Kristensen et al., 1999; Lester, Cucca, Andreozzi, Flanagan, & Oh, 1993; Roy, Cole, Goldman, & Barris, 1993; Suri et al., 2002; Taddio, Ito, & Koren, 1996; Yoshida, Smith, Craggs, & Kumar, 1998)
	Fluvoxamine	Luvox	(Arnold, Suckow, & Lichtenstein, 2000; Birnbaum et al., 1999; Hagg, Granberg, & Carleborg, 2000; Hendrick, Fukuchi et al., 2001; Kristensen, Hackett, Kohan, Paech, & Ilett, 2002; Piontek, Wisner, Perel, & Peindl, 2001; Wright, Dawling, & Ashford, 1991; Yoshida, Smith, & Kumar, 1997)
	Paroxetine	Paxil	(Begg et al., 1999; Birnbaum et al., 1999; Hendrick, Fukuchi et al., 2001; Hendrick, Stowe, Altshuler, Hostetter, & Fukuchi, 2000; Misri, Kim, Riggs, & Kostaras, 2000; Ohman, Hagg, Carleborg, & Spigset, 1999; Spigset, Carleborg, Norstrom, & Sandlund, 1996; Stowe et al., 2000; Wisner, Findling, & Perel, 2001)
	Sertraline	Zoloft	(Altshuler et al., 1995; Birnbaum et al., 1999; Dodd, Stocky et al., 2000; Dodd, Stocky, Buist, Burrows, & Norman, 2001; Epperson, Anderson, & McDougle, 1997; Epperson et al., 2001; Hendrick, Fukuchi et al., 2001; Holland, 2000; Hostetter, Stowe, Strader, McLaughlin, & Llewellyn, 2000; Kristensen et al., 1998; Oca & Donn, 1999; Stowe et al., 1995; Stowe et al., 1997)
Monoamine Oxidase Inhibitors (MAOIs)	Moclobemide	Manerix	(Goodnick, 1994; Mayersohn & Guentert, 1995; Pons et al., 1990; Rybakowski, 2001)
	Phenelzine	Nardil	(Gracious & Wisner, 1997)
	Tranylcypomine	Parnate	—
	Terbutaline	—	(Boreus & de Chateau, 1982; Lindberg et al., 1984; Lonnerholm & Lindstrom, 1982)
Others	Amoxapine	Asendin	(Gelenberg, 1979)
	Bupropion	Wellbutrin	(Briggs, Samson, Ambrose, & Schroeder, 1993)
	Maprotiline	Ludiomil	—
	Mirtazapine	Remeron	—
	Nefazodone	Serzone	(Dodd, Maguire, Burrows, & Norman, 2000; Yapp et al., 2000)
	Trazodone	Desyrel	(Verbeeck, Ross, & McKenna, 1986)
	Venlafaxine	Effexor	(Hendrick, Altshuler, Wertheimer, & Dunn, 2001; Ilett et al., 1998; Ilett et al., 2002)
	St John's Wort	—	(Klier, Schafer, Schmid-Siegel, Lenz, & Mannel, 2002)

Interpersonal Psychotherapy

Three studies have been found evaluating the effectiveness of interpersonal psychotherapy (IPT) on the treatment of both antepartum and postpartum depression. In a 16-week pilot study conducted with 13 pregnant US women who met DSM-III-R criteria for major depression, participants attended weekly 50-minute interpersonal sessions and completed pre and post treatment the Hamilton Rating Scale for Depression (HRSD), Beck Depression Inventory (BDI), and EPDS (Spinelli, 1997); specific intervention details were not reported. Depression ratings decreased significantly throughout the treatment program and of the 10 women available at the 12-week assessment, none reported depressive symptomatology. This preliminary work suggests a need for a larger trial to determine IPT efficacy.

In another descriptive study, US researchers used an adapted form of IPT for the treatment of postpartum depression; the modifications included an emphasis on assisting participants to resolve marital disputes and major role transitions that frequently occur in the postpartum period (Stuart & O'Hara, 1995a). Six mothers who met DSM-III-R criteria for major depression were treated for 12 weeks. Using the HRSD, BDI, and EPDS, significant changes for all measures were found post-treatment. Advancing this pilot work in a well-designed US trial, 120 postpartum women meeting DSM-IV criteria for major depression were recruited from the community and randomly assigned to either 12 weeks of IPT (n = 60) or a waiting list condition (WLC) control group (n = 60) (O'Hara et al., 2000). Follow-up data was collected via interview and self-report assessments of depressive symptomatology every 4 weeks; 99 (83%) of the 120 women completed the protocol. Mean HRSD scores of the women receiving IPT declined from 19.4 to 8.3, a significantly greater decrease than that which occurred in the WLC group (19.8 to 16.8). Similarly, mean BDI scores of the women who received IPT declined from 23.6 to 10.6 over 12 weeks, a significantly greater decrease than that which occurred in the WLC group (23.0 to 19.2). More women who received IPT recovered from their depressive episode based on HRSD scores of 6 or lower (37.5%) and BDI scores of 9 or lower (43.8%) compared with women in the WLC group (13.7% and 13.7%, respectively). Even though the outcomes assessors were not blinded to group allocation and the sample was homogeneous (e.g., Caucasian, educated, and married), these findings suggest that IPT may be an efficacious treatment for postpartum depression and represents a viable alternative to pharmacological interventions.

IPT has also been evaluated in a group modality. In an Austrian study, 17 women diagnosed with postpartum depression (DSM-IV criteria) participated in a group-based IPT intervention that consisted of two 60-minute individual sessions to explain IPT, nine weekly 90-minute group sessions, and one 60-minute individual termination session (Klier, Muzik, Rosenblum, & Lenz, 2001). Women were also provided with the telephone numbers of other group members to obtain additional support if needed. Mean score

comparisons revealed significant changes from baseline to post-treatment for both the EPDS and HRSD. At post-treatment, 10 (59%) mothers demonstrated full remission (HDRS < 9), five (29%) established partial remission (score decrease >50%), and two (12%) showed no improvement. Follow-up assessments at 24 weeks revealed a continued treatment effect. While the results indicate that group-based IPT may have positive implications for the treatment of postpartum depression, demonstrating both short-term and longer-term effects, study limitations such as the small sample size, absence of a control group, possible outcome assessment bias, and lack of intervention adherence render the results questionable. Furthermore, with the provision of telephone-based peer support, the possible effect of a co-intervention cannot be dismissed.

Cognitive Behavioural Therapy

In addition to the UK trial previously discussed that evaluated the effectiveness of fluoxetine and cognitive behavioural counselling (Appleby et al., 1997), three studies have been found incorporating a cognitive behavioural therapy (CBT) intervention in the treatment of postpartum depression. In an Australian trial, the effectiveness of CBT alone on postpartum depression was evaluated. The aims of this study were (1) to establish whether Early Childhood Nurses (ECNs) could be trained to deliver a modified CBT intervention for postpartum depression and (2) to compare the outcome of women treated with this therapy with 'ideal standard care' using non-specific counselling by ECNs with no additional training (Prendergast & Austin, 2001). Five ECNs were trained in CBT and supervised weekly. Postpartum women were recruited via regular screening by ECNs using the EPDS (score above 12) and diagnostically assessed by a clinical interview. Women with DSM-IV major depression ($\underline{n}$ =37) were then randomized to either an 'ideal standard care' group ($\underline{n}$ =20), which incorporated six weekly clinic visits or a CBT group ($\underline{n}$ =17), which consisted of six weekly one-hour home-based sessions by one of the CBT trained ECNs. Two stages of follow-up were undertaken: an interview immediately post-treatment and a postal questionnaire at 24 weeks. The training package was evaluated both by ECN completed questionnaires and analysis of taped therapy sessions. These evaluations indicated that ECNs could indeed deliver modified CBT. While there was a statistically significant difference in the EPDS scores between the two groups at baseline (CBT group $\underline{M}$ = 15.9 vs. control group $\underline{M}$ = 13.7), no group differences were found post-treatment or at the 24-week follow-up. However, there was a very high rate of recovery at initial follow-up with 70% to 80% of all participants having an EPDS score below 10. While this trial suggests that ECNs can provide a modified CBT intervention in the treatment of postpartum depression, for the majority of this sample with mild-moderate depression, perceived support from an ECN (forming an integral part of both the baseline assessment interview and control condition) appears to be as effective as modified CBT. Study limitations include a small sample size and significant group differences in baseline EPDS scores. Furthermore, 70% of control ECNs used some form of problem solving and pleasant-event scheduling strategies, providing significant similarities to the intervention.

In a French trial, pregnant women were screened with the EPDS during an obstetric clinic. Two hundred and fifty eight mothers at-risk of postpartum depression (EPDS scores above 8) were alternately assigned to either a prevention/treatment group or a control group (Chabrol et al., 2002). At 4 to 6 weeks postpartum, mothers with probable depression (EPDS scores above 10) were further assessed using the Hamilton Rating Scale for Depression (HRSD) and the Beck Depression Inventory (BDI). Participants with major depression continued in the control group (n = 30) or the intervention group (n = 18), which consisted of a cognitive-behavioural program of between five to eight 1-hour weekly home-visits (M = 6.6, SD = 1.6) that comprised of four components (i.e., supportive, educational, cognitive-behavioural, and psychodynamic). Based on HRDS, BDI, and EPDS scores, a significantly greater proportion of mothers in the intervention group recovered than mothers in the control group. In particular, recovery rates (HRSD score below 7) were 66.6% for the intervention group versus 6.6% for the control group. However, the small sample size, non-random group allocation (alternate numbers), and high initial dropout after group assignment suggest a larger well-conducted trial is required to confirm the study results.

CBT has also been evaluated using a group modality. In a pilot trial, 20 Australian women, recruited via local hospitals and maternal health centres, were eligible for participation if their postpartum depression developed within 24-weeks of delivery and they had a score above 12 on the EPDS and above 15 on the BDI (Meager & Milgrom, 1996). Consenting women were randomly allocated to either a waiting-list control group (mothers had an opportunity to participate in the treatment program once the study was completed) or an intervention group, which consisted of a ten-week, 90-minute group program, based on CBT principles that targeted postpartum depression risk factors. Women in the intervention group also exchanged telephone numbers and met outside the program. Six out of the 10 mothers in the intervention group completed the program and provided follow-up data. Following treatment, there was a significant reduction in EPDS and BDI scores, both within the intervention group and between the intervention and control groups. While the intervention resulted in a statistically significant improvement in depressive symptomatology, women were still moderately depressed. By contrast, depressive symptomatology in the control group did not change over the 10-week period. Despite the encouraging results, support from other participants outside the program was provided to women in the intervention group and eight of the 20 participants had been on antidepressant medication for at least 8 weeks before trial initiation, making it impossible to separate out the antidepressant, CBT, and peer support treatment effects. Furthermore, only six women in the intervention group and three women in the waiting list control group completed the program also raising questions about intervention acceptability. As such, further detailed studies are required to advance this pilot work.

Psychosocial Interventions

Peer Support

Detailed analyses of social support variables in predictive studies clearly suggest the following social deficiencies significantly increase the risk of postpartum depression: (1) not having someone to talk openly with who has shared and understood a similar problem (Brugha et al., 1998), (2) lacking an intimate confidant or friend to converse with (Brugha et al., 1998; O'Hara, Rehm, & Campbell, 1983; Paykel, Emms, Fletcher, & Rassaby, 1980; Romito, Saurel-Cubizolles, & Lelong, 1999), (3) not receiving support without having to ask for it (Brugha et al., 1998), and (4) feeling socially isolated (Mills et al., 1995). Conversely, companionship and belonging to a group of similar others has a protective effect (Cutrona, 1989). In interviews with depressed mothers (n = 60) participating in a population-based study, women were asked for their own explanations as to why they experienced postpartum depression; a "lack of support" and "feeling isolated" were the most common responses (Small, Johnston, & Orr, 1997). When asked what advice they would give to new mothers currently suffering from postpartum depression, the foremost suggestion proffered was "find someone to talk to." These findings support several researchers who have recommended the provision of peer (mother-to-mother) support in a group modality for women experiencing postpartum depression (Eastwood, 1995; Pitts, 1995). However, the results from three investigations are equivocal. In a Canadian study, the effect of a support group was evaluated through the recruitment of mothers on the second postpartum day who were asked to complete and return via mail a set of mood scales during the first 2 weeks postpartum (Fleming et al., 1992). Of the 1081 questionnaires distributed over a 3-year period, 781 (72%) were returned with 156 mothers scoring above the depression threshold of 35 on the "Current Experience Scale" and either above 13 on the EPDS or 21 on the Multiple Affect Adjective Checklist. Seventy-six mothers with depressive symptomatology (48% of all depressed mothers) and 76 non-depressed mothers were recruited into the study. Participants were non-randomly allocated to either a support group (eight weekly 2-hour semi-structured group sessions facilitated by two psychologists; n = 44), a 'Group-by-Mail' group (to determine whether the support group effects were due to social interactions with other women, participants in this group received scripts via mail that were adapted from the support group sessions; n = 15), or a control group (usual postpartum care; n = 83). All groups included mothers who were depressed and non-depressed. Participants completed the Center for Epidemiological Studies Depression Scale (CES-D) at 6 and 20 weeks postpartum and were categorized as either depressed or non-depressed. The ANOVA for social support versus control group at the 6-week assessment showed that 'depressed' women had significantly more negative feelings about themselves, their partners, and motherhood than non-depressed mothers. At 20 weeks, although over 90% of the women in the support group reported that the intervention was beneficial, depressed mothers showed significantly less improvement in self-image than those in the control group and some underwent deterioration in their feelings. While the majority of participants experienced an improvement in mood from 2 to 20 weeks postpartum regardless of group

allocation, the support group interventions did not significantly alleviate maternal depression and were detrimental to depressed mothers' self-image. In addition to serious study limitations such as a poor measure of postpartum depression, non-random group allocation, unequal group numbers, and a significant difference between study groups in relation to maternal age, theoretical limitations also existed. Research suggests that depressed individuals prefer to be with others who are depressed and that they feel worse after speaking with non-depressed people, but not after speaking with similar others (Rosenblatt & Greenberg, 1991). As such, the finding that depressed women felt worse after the support group meetings is not unexpected.

Recognizing this theoretical principle, a Chinese trial evaluated the effect of weekly support group meetings for women who were all experiencing postpartum depression (Chen, Tseng, Chou, & Wang, 2000). Mothers were recruited in-hospital on the second or third day postpartum to complete and return via mail the Beck Depression Inventory (BDI) at 3 weeks postpartum. Eighty-five percent of mothers approached agreed to participate (n = 941) with 414 returning the completed BDI. Sixty mothers with BDI scores above 9 were randomized to either a support group (4 weekly semi-structured sessions facilitated by a nurse, each 1.5 to 2 hours in duration; n = 30) or a control group (usual postpartum care; n = 30). At the 4-week assessment, mothers who attended the support sessions had significantly decreased BDI scores than mothers in the control group. In particular, 60% (n = 18) of mothers in the control group exhibited depressive symptomatology in comparison to only 33% (n = 9) of mothers in the support group. While this is the first randomized controlled trial to evaluate the effectiveness of support groups, several limitations existed including: (1) only 44% of mothers returned the screening questionnaire, (2) inexplicit randomization method, (3) of the 115 mothers who met the inclusion criteria, only 60 were randomized and it is unknown what happened to the other 55 potential participants, (4) unstandardized intervention as two support groups met for five sessions instead of the scheduled four, and (5) data analysis was not based upon intent-to-treat procedures. Thus, the positive results of this trial are questionable.

Finally, a group program for postnatally distressed Australian women and their partners was evaluated (Morgan, Matthey, Barnett, & Richardson, 1997). The term ‘distress’ was used to indicate that no diagnostic interview was undertaken to determine eligibility but rather women had a mixture of depressive symptomatology based on EPDS scores above 12. The program consisted of eight weekly 2-hour sessions, including one session for the couple, facilitated by an occupational therapist and nurse where psychotherapeutic and cognitive-behavioural strategies were employed to assist them in dealing with their postpartum concerns. The results from six separate groups are reported, in which 34 couples participated; only one mother dropped out and attendance was over 90%. Seventeen mothers were simultaneously receiving treatment by another health professional and some were on antidepressant medication. Participants completed the EPDS and General Health Questionnaire (GHQ) during the first and last session and were followed-up at 12 months. At program initiation, 66% of mothers had EPDS scores above 12, which

decreased to 22% at the final session, and no participant exhibited depressive symptomatology at the 12-month follow-up. While these results appear promising, the lack of a control group and the fact that over half of the mothers were receiving additional treatment for their postpartum depression, including antidepressant mediation, render the therapeutic effectiveness of these group sessions unknown.

Transcending the typical group modality, a pilot trial evaluating the effect of telephone-based peer support on postpartum depression symptomatology was conducted (Dennis, 2003). Canadian mothers who scored above 9 on the EPDS were identified through region-wide screening at the 8-week immunization clinics managed by public health nurses. Forty-two eligible and consenting mothers were randomly allocated to either a control group (standard postpartum care; n = 22) or a peer support group (standard postpartum care plus telephone-based support, initiated within 48 to 72 hours of randomization, from a mother who had previously experienced postpartum depression and had attended a 4-hour training session; n = 20). Follow-up was conducted at 4 and 8 weeks post-randomization by blinded research assistants. Significant group differences were found in probable major depressive symptomatology (EPDS score above 12) at the 4 and 8-week assessments. Specifically, at the 4-week assessment 40.9% of mothers in the control group scored above 12 on the EPDS in comparison to only 10% in the peer support group. Similar findings were found at the 8-week assessment where 52.4% of mothers in the control group continued to score above 12 on the EPDS in comparison to 15% of mothers in the peer support group. A significant mean difference was found at the 4-week assessment between mothers in the control (M = 12.1; SD = 4.6) and peer support (M = 8.5; SD = 3.7) (t = 2.8, p = 0.008) groups. Comparable group differences were found at the 8-week assessment (t = 2.9, p = 0.006). These preliminary results suggest that telephone-based peer support may be an effective intervention and a larger randomized controlled trial will soon be underway.

Partner Support

In a Canadian trial to determine the impact of partner support in the treatment of mothers suffering from postpartum depression, women who met the DSM-IV criteria for major depressive disorder with postpartum onset were randomly allocated to either a control group (7 psycho-educational visits with a psychiatrist; n = 13) or an intervention group (7 psycho-educational visits with a psychiatrist during which the mother's partner participated in 4 of the sessions; n = 16) (Misri, Kostaras, Fox, & Kostaras, 2000). All women were administered a set of questionnaires that included the EPDS and underwent a clinical assessment using the Mini International Neuropsychiatric Instrument (MINI) during visits one and seven. Immediately post-intervention there were no significant differences in mean EPDS scores between the intervention (M =11.4, SD = 6.2) and control (M = 14.6, SD = 7.2; p = 0.20) groups. However, at the 4-week follow-up, significant group differences were found favouring the intervention group (M = 8.6, SD = 5.2 vs. M = 14.7, SD = 7.2; p = 0.013). Study limitations included a small sample, inexplicit randomization procedures, and significant group difference in baseline characteristics: partners of the women in the intervention group a significantly

higher level of dyadic adjustment, suggesting they had a more positive appraisal of the marriage than did their control-group counterparts. This is a serious limitation considering that the intervention is the inclusion of partner support in the psycho-educational visits. Despite these considerable limitations, the initial results from this trial suggest partner support may have a measurable effect on women experiencing postpartum depression and warrants further investigation.

Non-Directive Counselling

The importance of non-directive counselling, sometimes called 'listening visits,' has been highlighted in the literature (Clement, 1995; Gerrard et al., 1993; Holden, 1987). To determine the effectiveness of these 'listening visits,' 55 UK women identified as depressed, through community-based EPDS screening at 6 weeks postpartum and a home psychiatric interview at 13 weeks, were randomized to either a control group (routine primary care) or a counselling group (eight weekly counselling visits by health visitors who received minimal training in non-directive counselling methods) (Holden, Sagovsky, & Cox, 1989). Fifty of the 55 participants completed the trial, 26 in the counselling group and 24 in the control group. After a mean time interval of 13 weeks, mothers were re-administered the standardised psychiatric interview and EPDS at home by a psychiatrist blinded to group allocation. According to RDC criteria, 18 (69%) women in the counselling group had fully recovered in comparison to only 9 (38%) women in the control group. When women in the intervention group were asked if they had received any help for their depression, 23 (88%) women responded that talking to their health visitor had been the most important recovery factor. However, one third of the counselled women did not recover despite the intervention. Of this sub-group, two had a long history of depression, another had postpartum depression previously, and a further two had a family history of depression, signifying postpartum depression occurring in the context of a continuum of psychiatric disturbances may be less likely to respond to a psychosocial intervention. It is also noteworthy that three women in each group were considered to have taken antidepressant medication at a therapeutic level. Even with the limitations of a small sample size and the possible antidepressant co-intervention, the trial results suggest that counselling by health visitors may be valuable in managing postpartum depression.

Extending the findings of Holden et al. (1989), Wickberg and Hwang (1996) conducted a population-based trial to evaluate the effect of counselling among Swedish women. Mothers participated in a two-stage screening procedure completing the EPDS at 8 and 12 weeks postpartum. Women who scored above 11 on both screening occasions were interviewed at home by a clinical psychologist, blinded to EPDS scores, at 13 weeks postpartum using the Montgomery-Asberg Depression Rating Scale (MADRS). Women who were identified as depressed according to DSM-III-R criteria were randomly allocated to receive either routine primary care ($\underline{n}$ = 16) or counselling ($\underline{n}$ = 15), which consisted of 6 weekly 1-hour counselling sessions provided in the home or clinic by a nurse who received brief training in non-directive counselling methods. Twelve (80%) women who received counselling were fully recovered after the intervention in comparison to

4 (25%) mothers in the control group. The findings of this well-conducted trial are tempered by the small sample size.

Hormonal Interventions

Oestrogen Therapy

To evaluate the effect of oestrogen on postpartum depression, a double-blind, placebo-controlled trial was conducted. Sixty-one women with major depression, which began within 12 weeks postpartum and persisted up to 18 months, were randomly allocated to either an active treatment (12 weeks of transdermal 17beta-oestradiol 200 micrograms daily alone, then 12 weeks with added cyclical dydrogesterone 10mg daily for 12 days each month; n = 34) or a placebo (placebo patches and tablets according to the same regimen; n = 27) group (Gregoire, Kumar, Everitt, Henderson, & Studd, 1996). All mothers were assessed monthly using the EPDS and a clinical psychiatric interview (Schedule for Affective Disorders and Schizophrenia). On EPDS baseline assessments, women in both groups were severely depressed (intervention group M = 21.8, SD = 3.0 vs. placebo group M = 21.3, SD = 2.9) and 47% (n = 16) of women in the intervention group and 37% (n = 10) in the control group were taking antidepressant medication. During the first 4 weeks of therapy, mothers receiving oestrogen (M = 13.3, SD = 5.7) improved significantly more than mothers in the placebo group (M = 16.5, SD = 5.3). Mothers receiving the placebo also improved over time but on average, their scores did not fall below the screening threshold for major depression for at least 16 weeks. The estimated overall treatment effect of oestrogen on the EPDS was 4.38 points (95% Cl = 1.89 - 6.87). No other factors (e.g., age, psychiatric, obstetric and gynaecological history, severity and duration of current episode of depression, and concurrent antidepressant medication) influenced the response to oestrogen. This study demonstrates that transdermal oestrogen may be an effective treatment option for postpartum depression. However, further research is required to establish the minimum effective dose and duration of treatment as well as the antidepressant mechanism of oestrogen. The appropriateness of transdermal oestrogen also needs to be assessed in less severely depressed women.

Building upon a previous case study (Ahokas, Kaukoranta, & Aito, 1999), Ahokas and colleagues performed an open-label study of physiologic 17beta-oestradiol to further evaluate the treatment effect of estradiol (Ahokas et al., 2001). Twenty-three Finnish women fulfilling ICD-10 criteria for major depression with postpartum onset were consecutively recruited from a psychiatric emergency unit. Serum estradiol concentrations were measured at baseline and weekly during the 8-weeks of treatment with sublingual 17beta-estradiol; the treatment effect was assessed using the Montgomery-Asberg Depression Rating Scale (MADRS). At baseline, all women were severely depressed (MADRS total score M = 40.7; range, 35-45) and had a low serum estradiol concentration (M = 79.8 pmol/L; range, 23-140 pmol/L); in 16 (70%) mothers, the concentration was lower than the threshold value for gonadal failure. During the first week of treatment,

depressive symptoms diminished significantly resulting in a mean MADRS score of 11.0 (Z = -4.20, p < 0.001) and serum estradiol concentrations approached those of the follicular phase (M = 342 +/- 141 pmol/L). At the end of the second treatment week, the MADRS scores were compatible with clinical recovery in 19 (82.6%) mothers. This initial study illustrates that depressive symptomatology may be rapidly reduced in women who have documented estradiol deficiency through the treatment with 17beta-estradiol. Further research is required to determine the significance of estradiol in the pathophysiology of postpartum depression.

Other Interventions

Relaxation/Massage Therapy

Massage and relaxation therapies have been shown to decrease anxiety and elevate mood (McLean & Hakstian, 1979; Reynolds & Coats, 1986). To determine the effects of massage and relaxation therapies on postpartum depression, 32 US in-hospital adolescent mothers, who were determined to be depressed based on an Beck Depression Inventory (BDI) score above 16, were recruited and randomly allocated to either a massage therapy group (30-minute massage per day on two consecutive days per week for 5 consecutive weeks; n = 16) or relaxation therapy group (30-minute relaxation therapy session, consisting of 15 minutes of yoga and 15-mintues of progressive muscle relaxation, on two consecutive days per week for 5 consecutive weeks for a total of 10 sessions; n = 16) (Field, Grizzle, Scafidi, & Schanberg, 1996). The effects of the massage and relaxation therapies were assessed pre and post treatment on the first and last day of the sessions using the Profile of Mood States 14 item depression subscale (POMS-D). Results suggest that there was no difference in pre- and post-treatment POMS-D scores in relation to relaxation therapy but a significant difference in pre and post treatment scores on day 1 and 10 in relation to massage therapy. These results signify that unlike relaxation therapy, massage therapy may have a significant immediate effect on depression scores. However, the long-term effect of these therapies is unknown resulting in questionable clinical utility. Furthermore, the inexplicit randomization and trial procedures, small sample size, lack of a true control group, and poor measure of postpartum depression render these results equivocal.

While diminishing maternal depression does not necessarily improve mother-infant interactions, direct attempts to enhance the quality of mother-infant interactions, independently of improving maternal depression, have been reported with some success. To determine whether attending regular massage classes could reduce maternal depression and also enrich the quality of mother-infant interactions, a trial was conducted involving 34 primiparous UK mothers identified as being depressed following the completion of the EPDS at 4 weeks postpartum (Onozawa, Glover, Adams, Modi, & Kumar, 2001). Participants were randomly allocated to either an intervention group (five weekly 1-hour infant massage classes and a 30-minute informal support group; n = 19) or a control group (five weekly informal support groups; n = 15).

Changes in maternal depression were assessed at the beginning and end of the trial using the EPDS. Twelve mothers in the intervention group and 13 mothers in the control group completed all sessions (73.5%). Results suggest that there was a greater improvement in EPDS scores in the intervention group that in the control group; the median EPDS score for the intervention group at the final session was 5.0 (95% CI = 8.0 – 14.2) in comparison to 10.0 (95% CI = 4.6 – 9.0) for mothers in the control group. However, it should be noted that much of the effect occurred *before* the classes began, possibly reflecting expectation. The small sample size, inexplicit randomization procedures, lack of intent-to-treat data analysis, and inability to distinguish the contributing aspects of the infant massage class all diminish trial validity. Furthermore, only 25 mothers completed all the sessions rendering maternal acceptability debatable.

Bright Light Therapy

While bright light therapy has been shown to be an effective treatment for seasonal affective disorder and non-seasonal depression, two preliminary case report studies suggest that it may also have a beneficial effect on postpartum depression. For example, Corral, Kuan, and Kostaras (2000) report the cases of two women, suffering from postpartum depression and refusing to take antidepressant medication, who consented to a 4-week trial of phototherapy by means of a 10,000-lux light box for 30 minutes a day. Baseline Hamilton Rating Scale for Depression (HRSD) scores (29-item version) for both mothers were above 27 with each showing a 75% reduction in HRSD scores at their last treatment session (scores were 11 and 12). While no adverse effects during the course of treatment were reported, it is unknown whether the treatment effect was maintained once the phototherapy ended. It should also be noted that one mother felt her poor marital relationship precipitated her depression indicating a psychosocial aetiology and that the observed improved mood may be related to the daily social interaction received during treatment.

To further explore the use of bright light therapy, a study was conducted among 16 pregnant US women with major depression (Oren et al., 2002). Treatment consisted of ultraviolet fluorescent light incorporating a 100,000-lux box for 60 minutes daily beginning within 10 minutes of awakening for at least 3 to 5 weeks; compliance was monitored through daily answering machine reports of light use. The Hamilton Rating Scale for Depression (HRSD) was administered to assess treatment effect. After 3 weeks of treatment, mean HRSD scores improved by 49% with benefits seen through the 5 weeks of treatment; there was no evidence of adverse effects. These data provide support that bright light therapy may have an antidepressant effect and while it is evident that additional research is required, this treatment option may be a viable alternative for severely depressed mothers who are not responsive to traditional approaches.

Maternal and Infant Sleep Interventions

Some researchers have suggested the relationship between maternal sleep deprivation and postpartum depression. To determine the efficacy of critically timed sleep deprivation in major mood disorders (MMD)

occurring during pregnancy and postpartum, nine women who met DSM-IV criteria for a MMD with onset during pregnancy or within 1 year postpartum underwent a session of either early-night sleep deprivation (ESD), in which they were sleep deprived in the early part of one night and slept from 03:00-07:00 h, or late-night sleep deprivation (LSD), in which they were deprived of sleep in the latter part of one night and slept from 21:00-01:00 h (Parry et al., 2000). After 1 week of regular sleep, mothers who relapsed were crossed-over to the alternate sleep deprivation condition. Depressive symptomatology was assessed pre and post intervention and after a night of recovery sleep (sleep 22:30-06:30 h) by trained clinicians, blinded to treatment condition, using Hamilton Rating Scale for Depression (HRSD) and Beck Depression Inventory (BDI). More participants responded to LSD (nine of 11 sessions: 82%) compared with ESD (two of six sessions: 33%) and they responded more after a night of recovery sleep (nine of 11 nights: 82%) than after a night of sleep deprivation (six of 11 nights: 55%). Pregnant women were the only responders to ESD and the only non-responders to LSD. This study has severe methodological limitations, such as the small and heterogeneous sample size, and meaningful clinical utility has not been demonstrated making the feasibility of conducting a larger study debateable.

Commonly used behavioural interventions have been shown to decrease infant sleep problems and maternal reports of depressive symptomatology. However, uncontrolled trials, small sample sizes, and short follow-up render the results equivocal (Armstrong, Van Haeringen, Dadds, & Cash, 1998; Leeson, Barbour, Romaniuk, & Warr, 1994; Rickert & Johnson, 1988). To address this issue a well-designed trial was conducted with 156 Australian mothers of infants aged 6-12 months with severe sleep problems. Participants were recruited from well child clinics to compare the effect of a behavioural sleep intervention on infant sleep problems and maternal depression (Hiscock & Wake, 2002). Mothers in the intervention group attended three private consultations with a senior paediatric trainee, held every 2 weeks at their local maternal and child health centre; sleep management plans were also tailored according to individual needs (n = 76). Mothers also received information about the development and management of sleep problems and an information sheet about normal sleep patterns. Mothers in the control group were mailed only the information sheet (n = 76). All participants completed the EPDS at 8 and 16 weeks post-randomization. At 8 weeks, more sleep problems had resolved in the intervention group than in the control group and depressive symptomatology scores decreased more in the intervention group (mean change = -3.7, 95% CI = -4.7 to -2.7) than in the control group (mean change = -2.5, 95% CI = -1.7 to -3.4) (p = 0.06). For the subgroup of mothers with baseline EPDS scores above 9, depression scores fell significantly further for mothers in the intervention group (mean change = -6.0, 95% CI = -7.5 to -4.0) than mothers in the control group (mean change = -3.7, 95% CI = -4.9 to -2.6) (p = 0.01) at 8 weeks; similar results were found at 16 weeks (p = 0.04). These findings suggest an infant sleep modification intervention may significantly decrease depressive symptomatology, especially among mothers with high depression scores.

Electroconvulsive Therapy

For severely depressed pregnant women electroconvulsive therapy (ECT) has been advocated by several researchers as an effective treatment option (Bhatia, Baldwin, & Bhatia, 1999; Dorn, 1985; Livingston, Johnstone, & Hadi, 1994; Rabheru, 2001; Walker & Swartz, 1994; Yellowlees & Page, 1990). There are no randomized trials.

Table 2-6. Postpartum Depression Treatment Studies

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Antidepressant Medication				
(Appleby et al., 1997)	RCT[1] Random allocation by computer-generated numbers Double-blinding Intent-to-treat	87 UK women with major PPD[2] at 6 to 8 weeks postpartum	Four treatment groups: (1) fluoxetine and 1 CBT session, (2) fluoxetine and 6 CBT sessions, (3) placebo and 1 CBT session, or (4) placebo and 6 CBT sessions -Sessions derived for health visitors after brief training but provided by a psychologist with no previous clinical experience over 12 weeks	PPD at 1, 4, and 12 weeks post-treatment Clinical interview, EPDS, and HRSD	Significant improvements seen in all 4 treatment groups. The improvement with fluoxetine was significantly greater than placebo. Improvement after 6 sessions of counselling was significantly greater than after one session. Interaction between counselling and fluoxetine was not statistically significant. All group improvements were complete by 4 weeks.	Significant number of eligible women declined participation due to reluctance to take anti-depressant medication No true control group (no treatment)
(Stowe et al., 1995)	Open-label single group	26 US women with major depression that developed within 24 weeks postpartum	8 weeks of sertraline using an initial dose of 50mg/day, adjusted according to side effects and depression severity, to a maximum dose of 200mg/day.	PPD post-treatment SIGH-D, EPDS, and BDI	20 out of 24 women exhibited a salutary response as defined by >50% reduction in SIGH-D baseline scores; 14 out of 21 women demonstrated complete symptom remission.	Small sample size Lack of a control group Participants were not blinded to treatment Potential co-intervention through the provision of support
(Suri et al., 2001)	Open-label single group	6 US women with major PPD onset within the first 8 weeks - Identified using the EPDS and HRSD	Fluvoxamine treatment, 50 mg/day titrated to 150 mg/day over 2 weeks	PPD at 8 week post-treatment HRSD	Significant decline in HRSD scores over time with the greatest degree of improvement occurring between weeks 2 and 3	Small sample size Lack of a control group Participants were not blinded to treatment
(Cohen et al., 2001)	Open-label single group	15 US women who met DSM-III-R criteria for major depressive disorder with onset within the first 12 weeks postpartum	8 weeks of venlafaxine (immediate release; M dose = 162.5 mg/day)	PPD post-treatment HRDS	Twelve of 15 women experienced remission of major depression (HRSD score below 8)	Small sample size Lack of a control group Participants were not blinded to treatment

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Interpersonal Psychotherapy				
(Spinelli, 1997)	Single group pilot study	13 US pregnant women Identified using a structured clinical interview for DMS-III-R and HRSD	16-week treatment program incorporating weekly, 50-minute individual IPT sessions	PPD post-treatment and at 12 weeks postpartum HRSD, BDI, EPDS	Mean depression scores decreased significantly for all measures from week 0 to 16. Of the 10 women available at 12 weeks, none reported depressive symptomatology	Small sample size Lack of a control group Atypical sample (12 participants had a personal or family history of depression) Intervention provider was not reported
(Stuart & O'Hara, 1995b)	Single group	6 US women (on average 4 months postpartum) Identified using DSM-III-R criteria	12 weeks of IPT with modifications to include assistance with marital disputes and major role transitions	PPD post-treatment HRSD, BDI, and EPDS,	Significant changes for all measures were found post-treatment	Small sample size Lack of a control group Intervention provider was not reported
(O'Hara et al., 2000)	RCT Group allocation based on a random numbers table Power analysis Intent-to-treat	120 US women Multi-stage community screening Identified using the IDD, SCID, and HRSD I = 60 mothers[3] C =60 mothers	Twelve 60-minute individual sessions by trained therapists during a 12-week period in standard fashion according to manual guidelines	PPD at 4, 8, 12 weeks following group assignment HRSD by interview BDI self-report	Recovery rates based on HRSD scores (< 7) significantly favoured IPT (37.5%) over the waiting list controls (13.7%). Based on BDI scores (<10), again recovery favoured IPT (43.8% vs. 13.7%)	Participants were mostly educated, Caucasian, married women Clinical interviewers were not blinded to group allocation
(Klier et al., 2001)	Single group	17 Austrian women between 4 to 45 weeks postpartum presenting to a maternal mental health service either through referral or advertisement Identified using the DSM-IV and HRSD	Two 60-minute individual sessions to explain IPT, nine weekly 90-minute group sessions, one 60 minute individual termination session, and telephone numbers of other group members for support	PPD post-treatment and 6-month follow-up EPDS and HRSD	At post-treatment 10 of 17 women (59%) demonstrated full remission (HDRS < 9), 5 women (29%) demonstrated partial remission (score decrease >50%) and 2 women (13%) demonstrated no improvement. Women's depression levels from post-treatment to 6-month follow-up were stable or continued to decrease.	Small sample size Lack of a control group Possible co-intervention through the provision of peer support outside of the group setting 35% of participants terminated intervention early Investigator-based assessments of treatment outcome

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Cognitive Behavioural Therapy				
(Appleby et al., 1997)	See above					
(Prendergast & Austin, 2001)	RCT	37 Australian women Screened by nurses Identified using EPDS and clinical interview I = 17 mothers C = 20 mothers	Six weekly 60 minute home-based CBT sessions by trained Early Childhood Nurses (ECN)	PPD post-treatment and 6-month follow-up EPDS and MADRS	No significant group difference in mean EPDS or MADRS scores at all time periods	Small sample size Inexplicit randomization process Significant group differences in baseline EPDS 70% of control ECNs used some form of problem-solving and pleasant-event scheduling providing significant similarities to the intervention
(Chabrol et al., 2002)	Quasi-experimental Group allocation based on alternate numbers	48 French women Screened using EPDS Verified using HRSD and BDI I = 18 mothers C = 30 mothers	Five to eight 1-hour weekly home-visits (M = 6.6, SD = 1.6) that had four components (supportive, educational, cognitive-behavioural, and psychodynamic)	PPD at post-treatment EPDS, HRSD, & BDI	Significant group differences. Recovery rates (HRSD score below 7) were 66.6% for the intervention group versus 6.6% for the control group.	Small sample size Non-random group allocation High initial dropout after group assignment
(Meager & Milgrom, 1996)	Pilot RCT	20 Australian women with severe and long-standing PPD which developed within 6 months were recruited by local hospitals and maternal health centres EPDS and BDI I = 10 mothers C = 10 mothers	Ten weekly 1.5 hour group sessions based on CBT conducted by a clinical psychologist. Women exchanged telephone numbers and met outside the program	PPD post-treatment EPDS, BDI and POMS	Following treatment, significant reductions in depression scores on all measures within the treatment group and between the treatment and control groups. However, due to initial severity of PPD, many women were still moderately depressed following treatment. Depression scores did not change over the 10 weeks for control group women.	Small sample size Inexplicit randomization process 40% of women were on anti-depressant medication 40% of participants terminated intervention early Possible co-intervention through the provision of peer support outside of the group setting

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Peer Support				
(Fleming et al., 1992)	Quasi-experimental	142 Canadian women recruited on postpartum wards to return screening instrument at 2 weeks Identified using CES-D and EPDS I_1 = 44 mothers I_2 = 15 mothers C = 83 mothers	Two treatment groups: (1) eight weekly semi-structured group sessions lasting 2 hours provided by 2 psychologists, (2) 'group by mail' where transcripts of the preceding support group were mailed to women	PPD at 6 weeks and 5 months CES-D	At 5 months, there was a significant improvement in maternal mood independent of group allocation. The supportive interventions did not modify maternal mood. Depressed mother had more negative feelings towards themselves, their partners, and the motherhood role than non-depressed women.	Non-random group allocation Significant differences in group sizes 'Depressed' and 'non-depressed' women participated in all study groups Weak measure of PPD
(Chen et al., 2000)	RCT	60 Chinese women recruited on postpartum wards to return screening instrument at 3 weeks Identified using BDI I = 30 mothers C = 30 mothers	Four weekly semi-structured group sessions lasting 1.5 to 2 hours, facilitated by a nurse	PPD post-treatment at 4 weeks BDI	Significant decrease in BDI scores in women attending support group. At the 4-week assessment 60% of women in the control group remained depressed in comparison to only 33% in the support group.	Only 44% of mothers returned screening questionnaire Inexplicit randomization process Unstandardized intervention Data analysis was not intent-to-treat
(Morgan et al., 1997)	Single group	34 Australian women including 20 partners Identified using EPDS	Eight weekly 2-hour group sessions and 1 couple session facilitated by a nurse and occupational therapist using psychotherapy and cognitive behavioural strategies Telephone support from facilitators and referral available between groups if required	PPD post-treatment at 8 weeks and at 12 month follow-up EPDS and GHQ	Significant decrease in maternal scores pre and post-treatment. 22% of women scored > 12 on EPDS post-treatment and no women exhibited depressive symptoms at the 12 week follow-up.	Small sample size Atypical sample (74% had spent 1 week in a residential unit to help with mothering issues) Lack of a control group Co-interventions as 50% were receiving treatment by a health professional and "some" were on anti-depressant medication

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
(Dennis, 2003)	Pilot RCT Random allocation using sealed envelopes Intent-to-treat	42 Canadian women Screened by public health nurses during immunization clinic Identified using EPDS I = 20 mothers C = 22 mothers	Telephone-based support from a mother recruited from the community who previously experienced PPD and received a 4-hour training session Support individualized and based on maternal need	PPD at 4 and 8 weeks post randomization EPDS	Significant group differences were found in probable major PPD (EPDS > 12) at all time periods. At the 4-week assessment 40.9% of women in the control group scored > 12 on the EPDS in comparison to only 10% in the peer support group. Similar findings were found at 8 weeks.	Small sample size
		Partner Support				
(Misri, Kostaras, Fox et al., 2000)	RCT	29 Canadian women who met the DSM-IV criteria for major depressive disorder with postpartum onset I = 16 mothers C = 13 mothers	7 psychoeducational visits with a psychiatrist during which the mother's partner participated in 4 of the 7 sessions	PPD post-treatment and 4 week follow-up EPDS	Immediately post-intervention there were no significant group differences in mean EPDS scores ($p = 0.20$). At the 4-week follow-up, significant group differences in mean EPDS scores favouring the intervention group were found ($\underline{M} = 8.6$, $\underline{SD} = 5.2$ vs. $M = 14.7$, $SD = 7.2$, $p = 0.013$).	Small sample size Significant group difference in baseline characteristics related to their partners' marriage appraisals -Inexplicit randomization process
		Non-Directive Counselling				
(Holden et al., 1989)	RCT Group allocation based on random numbers	50 UK women Community based EPDS screening at 6 weeks with a second screening at 13 weeks via psychiatric interview I = 26 mothers C = 24 mothers	8 weekly counselling visits at home by health visitors trained in non-directive counselling	PPD at 13 weeks post randomization EPDS and clinical interview	Significant group differences were found. According to RDC criteria, 18 (69%) of the 26 depressed women in the counselled group had fully recovered in comparison to only nine (38%) of the 24 women in the control group.	Small sample size 3 women in each group were considered to have taken anti-depressant medication at a therapeutic level

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
(Wickberg & Hwang, 1996a)	RCT	31 Swedish women 2-stage population-based screening at 8 and 12 weeks using EPDS I = 15 mothers C = 16 mothers	6 weekly 1-hour counselling visits at home by nurses trained in non-directive counselling	PPD at 6 weeks post randomization Modified MADRS	Significant group differences were found. Twelve (80%) of 15 women with major depression in the study group were fully recovered after the intervention compared to four (25%) of 16 in the control group.	Small sample size Inexplicit randomization process
		Oestrogen Therapy				
(Gregoire et al., 1996)	RCT Double-blind	61 UK women with major depression, which began within 12 weeks postpartum and persisted for up to 18 months -Identified using EPDS and clinical interview I = 34 mothers C = 27 mothers	12 weeks of transdermal 17 beta-oestradiol 200 micrograms daily alone, then 12 weeks with added cyclical dydrogesterone 10mg daily for 12 days each month	PPD every 4 weeks for 24 weeks (end of treatment) EPDS and clinical interview	During the first 4 weeks of therapy, women receiving oestrogen improved significantly more (M = 13.3, SD = 5.7) than women in the placebo group (M = 16.5, SD = 5.3).	Small sample size 47% of women in the intervention group and 37% in the control group were taking antidepressant medication at trial enrolment A high EPDS cut-off score of 14 was used to determine initial eligibility Inexplicit randomization process
(Ahokas et al., 2001)	Open-label single group	23 Finnish women fulfilling ICD-10 criteria for major depression with postpartum onset	8-weeks of sublingual 17beta-estradiol	PPD at 2 weeks of treatment MADRS	MADRS scores were compatible with clinical recovery in 19 (82.6%) women.	Small sample size Lack of a control group

Study	Design	Participants			Intervention	Outcome Measure
		Relaxation/Massage Therapy				
(Field et al., 1996)	RCT	32 depressed US adolescent women Identified using BDI Massage = 16 mothers Relaxation therapy = 16 mothers	30 minute massage per day on two consecutive days per week for five consecutive weeks 30 minute relaxation sessions per day on two consecutive days per week for five consecutive weeks	PPD at session 1 and 10 POMS 14 item depression subscale	Relaxation therapy had no effect on post-therapy depression scores at either session 1 or 10. However, massage therapy had a significant immediate effect on depression scores at both time periods.	Small sample size Lack of a true control group Inexplicit randomization and trial procedures Weak measure of PPD Expressed disappointment may have influenced physiological results
(Onozawa et al., 2001)	RCT	34 UK primiparous women identified as being depressed at 4 weeks postpartum Identified using EPDS I = 19 mothers C = 15 mothers	Five weekly 1-hour infant massage classes and a 30-minute informal support group	PPD at last session EPDS	Median EPDS score for the massage group at the final session was 5.0 (95% CI = 8.0-14.2) in comparison to 10.0 (95% CI = 4.6 – 9.0) for the control group	Small sample size Inexplicit randomization process High attrition rate with the massage group Lack of intent-to-treat
		Bright Light Therapy				
(Corral, Kuan, & Kostaras, 2000)	Case report	2 Canadian women with severe postpartum depression Identified using HRSD	Daily phototherapy by means of a 10,000-lux light box for 30 minutes for 4 weeks	PPD at last session at 4 weeks HRSD (29 item version)	HRSD scores dropped from above 29 and 28 to 11 and 12 respectively.	Small sample size Lack of a control group
(Oren et al., 2002)	Single group	16 pregnant US women with diagnosis of major depression	Ultraviolet-screened diffuse white fluorescent light source incorporating a 100,000-lux box, tilted downward at home for 60 minutes daily beginning within 10 minutes of awakening for at least 3 weeks	Depression after 3 weeks of treatment HRSD	HRSD depression rating improved moderately by 49% after 3 weeks (between weeks 0 and 3 $t = 6.27$, $p < 0.001$)	Small sample size Lack of a control group

Study	Design	Participants	Intervention	Outcome Measure	Results	Limitations
		Sleep Interventions				
(Parry et al., 2000)	Single group	9 US women with DSM-IV criteria of depression with onset either in pregnancy or within 1 year postpartum	Either early-night sleep deprivation (ESD), sleep deprived in the early part of one night and slept from 03:00-07:00 h, or late-night sleep deprivation (LSD), deprived of sleep in the latter part of one night and slept from 21:00-01:00 h	PPD before and after the night of sleep deprivation and after a night of recovery sleep HRSD and BDI	More significantlyparticipants responded to LSD (nine of 11 trials: 82%) compared with ESD (two of six trials: 33%) and they responded more after a night of recovery sleep (nine of 11 nights: 82%) than after a night of sleep deprivation (six of 11 nights: 55%).	Small sample size Lack of a control group Certain items were deleted because the results could be meaningfully related to the mother's condition during a brief sleep deprivation protocol Limited number of women complied with the request to complete daily mood ratings
(Hiscock & Wake, 2002)	RCT Group allocation via pre-generated block sizes of 2 to 10 Power analysis Intent-to-treat	156 Australian women of infants aged 6 to 12 months with severe sleep problems Subgroup of women categorised as depressed Identified using EPDS I = 78 mothers C = 78 mothers	Discussion on behavioural infant sleep intervention (controlled crying) delivered over three consultations with a pediatric trainee	PPD at 8 and 16 weeks post-randomization EPDS	For the subgroup of women with baseline EPDS scores of above 9, depression scores fell significantly further for women in the intervention group than the control group at 8 weeks (-6.0 vs. -3.7, $\underline{p}$ = 0.01) and at 16 weeks (-6.5 vs. -4.2, $\underline{p}$ = 0.04).	67% of eligible mothers accepted trial participation 56% of participants had EPDS scores < 10 at trial the start of the trial making a significant reduction in scores unlikely

[1] RCT = randomized controlled trial; [2] PPD = postpartum depression; [3] I = intervention group and C = control group

Implications for Policy, Practice, and Research

While limited research has been conducted on the efficacy of pharmacological interventions for the specific treatment of postpartum depression, four small studies have shown antidepressant medications, especially SSRIs, may have a therapeutic effective for severely depressed women. Many women find this an unattractive treatment option (Appleby et al., 1997; Whitton et al., 1996). As such, high attrition of participants or lack of intervention compliance may be of concern in future studies requiring randomization to treatment conditions. Building upon the primarily descriptive studies thus far, well-designed randomized controlled trials are needed to significantly advance this postpartum depression treatment approach. However, it is important to highlight that antidepressant medication has been shown to be highly effective in the treatment of general depression. As such, a recommendation for its use to treat postpartum depression could be made based on this empirical work.

Research into the characteristics of pregnant and postpartum women and their intervention choice (e.g., antidepressant medication vs. other options) would be beneficial to health professionals. Furthermore, while no specific pharmacological treatment guidelines are available for postpartum depression, primarily due to the lack of research, there is a tendency to treat postpartum depression with less intensity (i.e., lower dose of medication and duration of treatment) than general depression (Jermain, 1995; Nonacs & Cohen, 1998, 2002). As such, rapidity of response to different antidepressant medications requires further investigation. Even with the potential benefits of antidepressant medication, it is important to note that this biological treatment approach primarily addresses symptom reduction and may not assist in altering the psychological, family and social factors that often contribute to or maintain the depression.

There are several different psychological approaches to the treatment of postpartum depression including cognitive behavioural therapy and interpersonal psychotherapy. Cognitive behavioural therapy is also an effective treatment for general depression with a meta-analysis of 28 studies suggesting that, given over an average of 14.9 weeks, this intervention is as effective (Dobson, 1989) as medication or other psychotherapies. In a large recent analysis of 4 trials (DeRubeis, Gelfand, Tang, & Simons, 1999), cognitive behavioural therapy fared as well as antidepressant medication with ‘severely’ depressed outpatients in four major comparisons. However, considerable time, commitment and cost is required from cognitive behaviour therapy participants and approximately 10% to 40% fail to complete full treatment, a compliance rate similar to pharmacotherapy (Evans et al., 1992). In this current review, four trials were found evaluating the effectiveness of cognitive behavioural therapy related to postpartum depression but all suffered significant methodological limitations, such as a small sample size or lack of a true control group. At this time, there is poor evidence regarding the inclusion or exclusion of this approach in postpartum depression treatment programs, but the primarily beneficial results suggest that further research is warranted. Similarly, psychotherapies that target interpersonal and/or current psychological problems related to depression have

been shown to be more effective than long-term analytic psychotherapies (Elkin et al., 1989). In this review, four studies were found evaluating the effectiveness of interpersonal psychotherapy; however, only one investigation was a well-designed trial (O'Hara et al., 2000). The results from this trial and the other single group studies suggest there is some evidence to support the recommendation that this approach may be effective in the treatment of postpartum depression. As such, structured cognitive behavioural therapy and interpersonal psychotherapy holds promise and well-designed trials with large samples are warranted. Future investigations should include long-term follow-up after intervention discontinuation and be designed to determine the comparative effectiveness of pharmacological and psychological treatments, using trained health professionals and standardized interventions.

Research has clearly shown that a lack of social support is a significant predictor of postpartum depression. As such, peer support interventions potentially have beneficial effects in treating women who have mild to moderate depression. Three studies have been found evaluating the effectiveness of professionally facilitated support groups. Unfortunately, theoretical limitations, such as the inclusion of both depressed and non-depressed women, and methodological weaknesses, including small samples sizes and single group or non-random samples, render the results equivocal. Well-designed trials with large, homogeneous samples are warranted. Future research should also include self-help groups (i.e., groups not facilitated by a health professional) to extend the testing of lay support models with mild to moderately depressed women and evaluations of eligible mothers who decline group interventions should be conducted to identify help-seeking barriers and possible solutions. Evaluations of the group intervention should include measures that assess group dynamics, social comparisons, and the provision of peer (mother-to-mother) support to determine the salutary components of support groups. A new intervention that holds promise is telephone-based peer support and further research is warranted.

One area that has received little attention is the role the spouse or partner plays in the prevention of or recovery from postpartum depression. Partners can be an excellent source of instrumental (e.g., sharing of childcare and domestic responsibilities) and emotional support and can be a mediating link between the mother and family members who may not understand the nature of postpartum depression. Further research is needed to identify the type and amount of social support that is most beneficial is assisting with postpartum depression.

Two European trials have been conducted evaluating the effectiveness of non-directive counselling with positive results suggesting this treatment modality may be a viable option for mothers with mild to moderate postpartum depression. These trials have demonstrated the feasibility of population-based screening and the application of home visiting using trained health professionals. Unfortunately, the most immediate problem is the small sample size in both trials. Contextual factors also decrease the application of the results to a

North American population where differences in the delivery of postpartum care exist. As such, a large randomized controlled trial is needed to replicate these auspicious results.

Oestrogen therapy has been advocated with preliminary results from two studies demonstrating effectiveness. Until better controlled trials are conducted, it is unclear whether specific subgroups of mothers, especially those with treatment resistant depression, derive an antidepressant benefit from supplemental oestrogen. Further research is highly recommended to establish dose response relations, optimum treatment duration, as well as the antidepressant mechanisms. Whether breastfeeding women can use oestrogen must also be carefully examined and research is needed into how changes in sex-steroid concentrations contribute to the occurrence of postpartum depression (Gregoire et al., 1996).

Two small studies have evaluated the effect of massage therapy on maternal mood demonstrating positive results. However, severe methodological limitations in both studies render the effect unknown. Maternal/infant massage therapy and sleep interventions hold promise and, with further research, these interventions may be beneficial secondary treatment options. Finally, for severely depressed individuals with acute suicidality or psychosis, electroconvulsive therapy is frequently the treatment of choice (Nonacs & Cohen, 2002). However, the relative effectiveness of electroconvulsive therapy for severely depressed expectant or postpartum women is unknown as no randomized controlled trials exist for this indication and most of the research thus far has been case studies. Similarly, only two case studies have been found exploring the effect of bright light therapy on severely depressed mothers. While these treatment approaches are not first-line options, if they are to become a component of a multifactorial treatment program well-designed randomized controlled trials are required to ascertain whether maternal mood improvement is specific to the intervention or a placebo effect from open treatment.

This review has clearly demonstrated that postpartum depression presents many special methodological complexities that need to be considered if scientific knowledge is to progress. First, there are particular difficulties in defining the target group to be studied, as diagnosis is much less concrete than in other areas where an initial assessment can be confirmed by laboratory tests. Second, many of the treatments used are hard to define with clarity as psychological and psychosocial interventions often involve talking and manipulation of the environment. Replicating such treatment with fidelity is challenging. Third, the nature of the interventions employed frequently result in co-interventions. Fourth, there are difficulties in establishing the relative costs and benefits of treatment, arising from the relapsing/remitting mature of postpartum depression. Finally, the context of postpartum depression research is crucial and the social, cultural, and organizational environment in which postpartum depression services takes place is highly variable. For example, the same intervention can have differing effects depending on context and variations in the control group.

Many of the dilemmas with postpartum depression research begin from the way in which interventions are evaluated. In this review, it was found that there was limited agreement on outcome measures, although the EPDS was the most consistently used measure of depressive symptomatology. Most studies obtained no information on maternal perceptions, such as whether the women simply felt better or even liked the intervention. Although postpartum depression can occur within the first year, most trials had follow-up periods of less than 6 months. Of the trials conducted, most were small with a mean sample size of approximately 43 women, although 300 would be more appropriate to detect clinically significant changes in depressive symptomatology. There were also high attrition rates, especially with group interventions. Examination of the wider impact of postpartum depression through economic evaluations was rarely conducted and impossible to complete post hoc due to small sample sizes. In addition, the practice of excluding participants that might potentially benefit (e.g. family history of depression) reduces generalizability. Finally, little attention has been paid to the context in which postpartum depression interventions have been evaluated. This covers not only the broad social and policy context of different countries but also control groups, which can be more variable than the intervention studies.

The challenge is to conduct methodologically rigorous randomized controlled trials remembering that one expensive randomized controlled trial may prove more cost effective than a large number of small studies with no meaningful results. To ensure that trials are well designed the following points need to be considered. Difficulties in definition of the postpartum depression should be confronted by using structured diagnoses or psychometrically tested self-report instruments such as the Edinburgh Postnatal Depression Scale. Dialogue between researchers should be encouraged to promote a consistency in outcome measures and research methods. Adequate sample sizes based on power analyses should be incorporated such that the results can be compared across different postpartum samples. Researchers should consider multiple dimensions of improvement. However, trials should focus on a small number of clear outcomes, in the interest of both clarity and maintaining the involvement of women. Long-term effects should be addressed by adequate length of follow-up. Trials should also be analysed by intention-to-treat without excluding those who dropout due to a change in treatment. Intervention replication can be achieved through a concise account not only of the intended but also the actual intervention in both the experimental and control group. Finally, maternal evaluations should be included to understand the nature of the intervention as well as what are important outcomes.

At present, definite conclusions cannot be reached about the relative effectiveness of these different treatment approaches due to the lack of well-designed investigations. Randomized controlled trials with large and representative samples are needed to compare different treatment modalities, examine the effectiveness of individual treatment components, and determine which treatments are most useful for women with different risk factors or clinical presentations of postpartum depression. As there is no single etiological

pathway by which women develop postpartum depression, it is improbable that a single treatment modality will be effective for all women. A multifactorial treatment approach, which combines the contributions of the psychological, psychosocial, and biological factors, is likely to be most beneficial as it recognizes various etiological factors and individual variations.

Table 2-7. Summary Recommendations for Treatment Interventions

Intervention Strategy		**Study**	**Research Design Rating[1]**	**Quality Rating[2]**	**Classification of Recommendation[3]**
Pharmacological	*Antidepressant Medication*	(Appleby et al., 1997)	RCT: I	Fair	I[4]
		(Stowe et al., 1995)	Descriptive: III	Poor	
		(Suri et al., 2001)	Descriptive: III	Poor	
		(Cohen et al., 2001)	Descriptive: III	Poor	
Psychological	*Interpersonal Psychotherapy*	(Spinelli, 1997)	Descriptive: III	Poor	I
		(Stuart & O'Hara, 1995b)	Descriptive: III	Poor	
		(O'Hara et al., 2000)	RCT: I	Fair	
		(Klier et al., 2001)	Descriptive: III	Poor	
	Cognitive Behavioural Therapy	(Appleby et al., 1997)	RCT: I	Fair	I[4]
		(Prendergast & Austin, 2001)	RCT: I	Poor	
		(Chabrol et al., 2002)	Quasi-Experimental: II-1	Poor	
		(Meager & Milgrom, 1996)	Pilot RCT: I	Poor	
Psychosocial	*Peer Support*	(Fleming et al., 1992)	Quasi-Experimental: II-1	Poor	I
		(Chen et al., 2000)	RCT: I	Poor	
		(Morgan et al., 1997)	Descriptive: III	Poor	
		(Dennis, 2003)	Pilot RCT: I	Fair	
	Partner Support	(Misri et al., 2000)	RCT: I	Poor	I
	Non-Directive Counselling	(Holden et al., 1989)	RCT: I	Fair	I
		(Wickberg & Hwang, 1996a)	RCT: I	Fair	
Hormonal	*Oestrogen Therapy*	(Gregoire et al., 1996)	RCT: I	Poor	I
		(Ahokas et al., 2001)	Descriptive: III	Poor	

Intervention Strategy		Study	Research Design Rating[1]	Quality Rating[2]	Classification of Recommendation[3]
Other	*Relaxation/ Massage Therapy*	(Field et al., 1996)	RCT: I	Poor	I
		(Onozawa et al., 2001)	RCT: I	Poor	
	Bright Light Therapy	(Corral, Kuan, & Kostaras, 2000)	Case Report: III	Poor	I
		(Oren et al., 2002)	Case Report: III	Poor	
	Sleep Interventions	(Parry et al., 2000)	Descriptive: III	Poor	I
		(Hiscock & Wake, 2002)	RCT: I	Fair	

[1] I = evidence from randomized controlled trial(s); II-1 = evidence from controlled trial(s) without randomization; II-2 = evidence from cohort or case-control analytic studies, preferably from more than one centre or research group; II-3 = evidence from comparisons between times or places with or without the intervention, dramatic results in uncontrolled experiments could be included here; III = opinion of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.

[2] Good = a study (including meta-analyses or systematic reviews) that meets all design-specific criteria well; Fair = a study (including meta-analyses or systematic reviews) that does not meet (or it is not clear that it meets) at least one design-specific criterion but has no known "fatal flaw"; Poor = a study (including meta-analyses or systematic reviews) that has at least one design-specific "fatal flaw", or an accumulation of lesser flaws to the extent that the results of the study are not deemed able to inform recommendation.

[3] A = there is good evidence to recommend this approach; B = there is fair evidence to recommend this approach; C = the existing evidence is conflicting and does not allow making a recommendation for or against use of this approach, however other factors may influence decision-making; D = there is fair evidence to recommend against this approach; E = there is good evidence to recommend against this approach; I = there is insufficient evidence (in quantity and/or quality) to make a recommendation, however other factors may influence decision-making.

[4]There is evidence based on the general depression research to recommend this approach.

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CHAPTER 3: THE EFFECT OF POSTPARTUM DEPRESSION ON THE MOTHER-INFANT RELATIONSHIP AND CHILD GROWTH AND DEVELOPMENT

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Citation:

This chapter should be cited as:
Grace, S.L., & Sansom, S. (2003). The effect of postpartum depression on the mother-infant relationship and child growth and development. In Stewart, D.E., Robertson, E., Dennis, C.-L., Grace, S.L., & Wallington, T. (2003). Postpartum depression: Literature review of risk factors and interventions.

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Financial assistance by Health Canada

CHAPTER 3: THE EFFECT OF POSTPARTUM DEPRESSION ON THE MOTHER-INFANT RELATIONSHIP AND CHILD GROWTH AND DEVELOPMENT

Table of Contents

CHAPTER SUMMARY

Introduction / Background

As mothers largely constitute infants' social environment and mediate their experience of the external world, it is imperative to investigate the effects of postpartum depression on mother-infant relations, and child growth and development.

Methods

Databases relating to the medical, nursing and social science literature were searched with specific inclusion/exclusion criteria and search terms for English language abstracts from 1990 onwards, as well as the gray literature. Seventy-eight relevant articles (59 primary studies and 19 review articles including 2 meta-analyses) were identified and critically evaluated for the purposes of this review.

Key Findings

Current research suggests that postpartum depression has salient but selective effects on the mother-infant relationship, and child growth and development. The strongest effects of postpartum depression are on cognitive development such as language, and IQ. Meta-analyses support medium to large effect sizes of postpartum depression on mother-infant relations in the first year postpartum. The odds are 5.4 times higher for 18-month old infants of postpartum depression mothers to display insecure attachment compared to infants of non-postpartum depression mothers. Postpartum depression may also lead to the early cessation of breastfeeding. With regard to emotional growth and development, studies support an early effect of PPD on infant affect, but do not support more longitudinal effects. Behavioural effects are variably supported, but may persist up to 5 years postpartum and beyond.

Implications for Practice, Policy and Research

It is likely that chronic or recurrent maternal depression is related to later effects on the child, rather than postpartum depression per se. These adverse effects of postpartum depression may be mediated through maternal interpersonal behaviour, life adversity, and sex of infant. Therefore, effective identification and evidence-based treatments for depression should be made available to women across the lifespan.

LIST OF TABLES

INTRODUCTION

As mothers largely constitute infants' social environments and mediate their experience of the external world, it is imperative to investigate the effects of PPD on mother-infant relations, and child growth and development. Even young infants are appreciably affected and highly sensitive to the quality of care they receive. Thus, the infant's interpersonal environment is likely to be affected by PPD symptoms such as persistently low mood, social withdrawal, irritability, impaired concentration, hopelessness, guilt, and anxiety. Recent work has begun to elucidate the course of infant and child development associated with PPD.

This chapter reviews the effect of PPD on the mother-infant relationship, with particular focus on harmony or attunement in interaction. Secondly, the literature on child growth and development is reviewed, with particular focus on emotional/affective development such as attachment, physical development, cognitive development (i.e., IQ), and child behaviour (e.g., sleep, crying, temper tantrums). The data available concerning subpopulations of mothers with PPD are then reviewed, to ensure representation of heterogeneous mother-infant dyads and consideration of populations which are vulnerable to PPD and its effects. This is followed by implications for practice, policy, and research, and the chapter closes with final conclusions.

Methods

All English language abstracts from 1990 onwards were reviewed through the use of the search terms listed below. The following databases were searched: PsycInfo, Medline, Embase, CINAHL, Cochrane, DARE, ProQuest, Web of Science, Social Sciences Citation Index, WHO Reproductive Health Library, and Health Star. Key contents of these journals for the last two years were hand searched, and grey literature (e.g., Dissertation Abstracts International, Marcé Society abstracts-International Society for the understanding, prevention and treatment of mental illness related to childbearing) were also searched.

Table 3-1. Search Terms Used to Identify Relevant Literature

postpartum depress:.mp.	post partum depress:.mp
postnatal depress:.mp.	post natal depress:.mp.
baby blues	postpartum blues
post partum blues	depression, postpartum
postpartum dysthymia	post partum dysthymia
puerperal disorders	puerperal psychosis
postpartum psychosis	post partum psychosis
mother-infant relations	mother-child relations
growth	child growth
crying	child development
mother child communication	attachment behavior
cognitive development	social development
emotional development	physical development
child behavior	

Inclusion criteria were English language, and date of publication from 1990 onwards. Exclusion Criteria were: Related to care, service provision, or intervention; Depression not postpartum-specific (see definition in Chapter 1); Source is popular press; Data relates to healthcare provider behavior or assessment; Related to epidemiology of postpartum depression; Postpartum assessment/measurement scales; Anecdotal, descriptive, small sample size and available at considerable cost of over $100USD. Based on this search, 122 articles were identified as potentially relevant. After excluding abstracts based on the above criteria and taking into consideration duplication, this method resulted in the retrieval of 78 articles; 59 primary studies, and 19 reviews (2 of which were meta-analyses; see Tables 3-2 and 3-8). While all of these studies were reviewed for the purpose of this chapter, 24 primary studies were ultimately deemed to be of sufficient scientific merit and contribution to the literature that they are summarized in tables at the end of their respective sections. This means that the methodologically strongest studies (based on sample size and composition, design, measures, and statistical analysis) for each outcome are described. If a meta-analysis was available for a particular outcome, it is presented first given that it empirically summarizes a larger sample than primary studies. Acronyms for measures and their full names are listed following the last table. Data was systematically abstracted from each article through Microsoft Access.

When presenting the review of literature below, criteria as outlined in the overview were used to assess the methodological quality of primary studies. In each section the methodologically strongest primary studies are presented first, followed by the next strongest study in descending order. The methods and limitations for each study are outlined for the reader (see also summary tables). Review articles were used for the purposes of generation of gaps in the literature, directions for future research, and conclusions.

PPD and The Mother-Infant Relationship

Harmony/Attunement

John Bowlby (1980), a psychoanalyst, described the mother-infant bond as a general tendency of both mother and infant to enter into social interaction with each other in the first few weeks and months after birth. Usually these interactions are characterized by lively, warm interchanges alternating with phases of disengagement. When an infant withdraws from the mother-infant interaction, a mother usually compensates to restore the interaction, often by matching her behaviors to the mood and state of the infant. In this manner a mother contributes to the development of an ongoing, interactive dialogue with her infant.

Why is the mother-infant bond crucial to child development? This bond leads to healthy behavioral, cognitive, social and interpersonal functioning, and is crucial to establish a secure base from which a young infant or child can begin to explore the outside world (Miller, 1999). To ensure healthy growth and development, mothers can engage in certain ‘attuned’ or ‘harmonic’ activities and behaviours such as giving clear cues, and being responsive to infant cues; the infant must in turn respond to the mother’s care giving; and finally the environment must support and facilitate this cycle. When the process works, mothers become

"attached" to their infants. When this process breaks down it can lead to insecure attachments between mothers and babies (Tronick & Weinberg, 1997).

The mother-infant relationship is generally measured through videotaped interactions. These procedures often use mirrors or two cameras to ensure the full-face view of both mother and infant can be coded simultaneously. These videotaped interactions occur either in a home environment, which provides more external validity, or in a controlled laboratory setting. The mother is requested to engage her infant in a task such as playing, or offering a toy or beverage. The interactions are generally coded by trained research assistants who are blind to depression status of the mother. Then a second blind observer codes the same observations to determine inter-rater reliability. The coding schemes vary widely across studies in content and number of variables.

One study measured mother-infant synchrony less subjectively, by digitally-recording vocal utterances and measuring timing of, and between, mother and 4-month old infant vocalizations (Zlochower & Cohn, 1996). The relation between switching-pause duration and postpartum depression was studied in 15 PPD mothers and 20 non-PPD mothers. Switching pauses refer to the duration of silence after the infant stops vocalizing and the mother begins. Assessment of PPD was conducted by trained clinicians using Research Diagnostic Criteria (RDC). Participants were videotaped in a split-screen paradigm in their homes during the day at a time when the infants were alert. During the 3-minute interaction, mothers were instructed to play with their infants without toys. Mothers with PPD had longer and more variable switching pauses compared to non-PPD mothers. This suggests that depression negatively affects the mother's ability to coordinate her vocal behaviour, which may contribute to reduced synchrony in depressed mother-infant interactions.

A meta-analysis published in 1995 by Beck reviewed 19 studies published between 1983 and 1993 to determine the magnitude of effect of postpartum depression on maternal-infant interaction during the first year after delivery (see Table 3-2). The ancestry and descendency approaches were used in conjunction with strong inclusion / exclusion criteria to thoroughly identify relevant articles. Tests of homogeneity and the fail-safe number (to control for the publication bias of positive results) were satisfied. Maternal-infant interaction was operationalized in three ways: maternal interactive behaviour, infant interactive behaviour, and dyadic interactive behaviour. The total sample size for the meta-analysis was 829 mother-infant dyads. The mean effect size weighted by sample size for maternal interactive behaviour was .68 (medium effect), for infant interactive behaviour was .75 (medium effect), and for dyadic interactive behaviour was 1.07 (large effect). A quality index was calculated for each study based on 10 criteria including first author expertise, funding, sampling, and measures. Although the operationalization of mother-infant relations is highly variable across studies, the quality of this meta-analysis is fairly high. Beck found that as the sample size and quality of the studies increased the effect sizes decreased, suggesting that more rigorous studies show less of an effect of PPD on mother-infant relationships.

During the review period of 1990 to present, Lynn Murray and colleagues published six seminal journal articles (Murray, Fiori-Cowley, Hooper, & Cooper, 1996a; Murray, 1992; Murray, Kempton, Woolgar, & Hooper, 1993; Murray, Hipwell, Hooper, Stein, & Cooper, 1996b; Sinclair & Murray, 1998; Murray et al., 1999), and edited a book (Murray & Cooper, 1997b) based on the same cohort of mothers and infants, examining the long-term effects of PPD on interaction, attachment, behavioural and cognitive outcomes. These outcomes are presented in the relevant sections in this chapter. To orient the reader, a review of the methodology for that study will be delineated at the outset. Women presenting on postnatal wards of a Cambridge, UK maternity hospital during the period from February 1986 to 1988 were approached and invited to participate in a study regarding the experience of motherhood and infant development. Inclusion criteria consisted of women who were primiparous, aged 20-40 years, married or cohabiting, had a 37-42 week pregnancy, intended to be the primary caregiver, and would be a continuing resident for the next 18 months. Seven hundred and two women were included in the sample (97% response rate; mean age 28, low risk of adversity). At six weeks postpartum, mothers were sent the Edinburgh Postnatal Depression Scale (EPDS). Those who scored 13 or higher were identified as PPD cases and were interviewed at 2-3 months postpartum by a trained clinician with the Standardized Psychiatric Interview. The Schedule of Affective Disorders and Schizophrenia (SADS) was used to assess lifetime history of psychological distress. A further structured interview was included to determine childhood and current family relationships, relationship with partner and confidants, obstetric history, attitude towards the pregnancy and infant, and housing and economic circumstances. For every case, a potential control was selected randomly from those who had a low EPDS score, no previous psychiatric history, and same sex infant. This yielded four experimental groups: (1) no previous depression or PPD (controls; n=42), (2) no previous depression but PPD (PPD; n=40), (3) previous history of major depression but no PPD (previous history; n=14), and (4) previous history and depression since delivery (PHPD; n=12). Mothers who experienced recurrent depressive episodes between the postpartum period and the 18-month assessment were excluded from analyses. Infant assessments at 9 months consisted of Piaget's object concept tasks. Infant assessments at 18 months included the Bayley Scales of Infant Mental Development (motor, perceptual, cognitive, linguistic and social abilities; (Bayley, 1969), the Reynell Scales of Language Development, attachment based on Ainsworth's strange situation (Ainsworth, Blehar, Waters, & Wall, 1978; Ainsworth & Wittig, 1969), and Piaget's object concept tasks. Maternal assessments at 18 months consisted of an adult attachment interview, the Life Events and Difficulties Schedule, a behavioural screening questionnaire for maternal report of child behaviour, and the EPDS and SADS. Assessments at 5 years included the SADS, the McCarthy scales of children's abilities, videotape of a 10-minute mother-child interaction over cake and fruit juice, and assessment of the home environment by a researcher blind to depression status of the mother.

Murray and colleagues (1996a), report on a subsample of 56 PPD dyads who were matched to 42 control group mother-infant dyads. Depression status was determined through a Standardized Psychiatric Interview. Mother-infant interaction was videotaped when the infant was two months old, and scored by a blind observer. Compared to the interactions of well women, those who were depressed were rated overall as less sensitive, and expressed fewer infant affirmations and more negations. The two groups did not differ in the degree to which the mothers were either intrusive, or remote and withdrawn from their infants, or infants were engaged actively with the mother, or the extent of either flat and inert, or else fretful and distressed behaviour.

What about longer-term effects of PPD on mother-infant interaction? Edhborg et al. (2001) videotaped mother-infant interactions at 18 months postpartum. The EPDS was used to assess depressive symptomatology at 2 months postpartum. The 24 PPD dyads, and 21 matched control dyads were observed in their family home for five minutes each during a free play, a structured task, and a separation/reunion protocol. Trained observers blind to PPD status coded the videotapes using the Parent-Child Early Relational Assessment Scale. Coding variables included maternal emotional availability, maternal negative affect, child quality of play, child negative and positive affect, dyadic mutuality, and maternal structuring and mediation. In the free play session, children of high EPDS scorers showed significantly less interest in exploring the environment and also less attention when playing with their mothers than did children of low EPDS scorers. In the structured task, with regard to maternal emotional availability, high EPDS scoring mothers were significantly less effective than low EPDS scorers at facilitating the child's acquisition of skills and mastery. No other significant differences were found. Particularly, scores on the EPDS were not significantly associated with the children's interaction style. Limitations include the non-use of RDC to assess PPD, and small sample size.

An older study using a larger sample size (n=98), standardized diagnostic interviews, assessors blind to PPD status, and a 19-month follow up suggested a more robust effect of PPD on mother-infant interaction (Stein et al., 1991). In bivariate analyses of a subset of 25 mothers who had PPD that had remitted by 19 months (i.e., no concurrent depression) versus a matched sample of control mothers, children of PPD mothers showed less affective sharing and significantly less sociability to strangers. In multivariate analyses taking into account PPD, concurrent maternal depression, as well as chronic social difficulties in the areas of marriage, finances, or housing, it was demonstrated that: low levels of maternal facilitation were significantly predicted most strongly by chronic social difficulties but also by PPD; low levels of affective sharing were predicted by chronic social difficulties, and PPD, but not by concurrent depression; low levels of child sociability with a stranger were predicted by concurrent maternal and not postpartum depression; child distress on mother's departure was predicted by chronic social and marital difficulties and concurrent (but not postpartum) depression; and lack of maternal warmth was significantly predicted by chronic social

difficulty only. This suggests that PPD may have an effect on affective sharing and maternal facilitation at 19 months postpartum, but not a universal effect on mother-child relationships.

This variability of effect is also seen in shorter-term follow-up studies (Cohn, Campbell, Matias, & Hopkins, 1990; Hoffman & Drotar, 1991; Righetti-Veltema, Conne-Perreard, Bousquet, & Manzano, 2002). The three-month follow-up study of Righetti-Veltema et al. (1991) recruited a sample of 570 women and their infants, 58 of whom were considered PPD with a score above 13 on the EPDS. Midwives were trained to administer the test battery at all time points with the same participants, precluding blinding. The PPD dyads showed less vocal and visual communications, less corporal interactions and less smiling. In a more methodologically rigorous study with a 2-month follow-up, Cohn et al. (1990) recruited a matched sample of 24 depressed and 24 non-depressed mother-infant dyads, and considered infant and maternal characteristics (including paid labour). Behaviours were scored by coders blind to participant diagnosis. PPD mothers and babies were significantly less positive that non-PPD dyads during face-to-face interactions, with the exception of PPD mothers who were working outside of the home more than 20 hours a week. The reduced positivity of interactions was brought about through decreased contingent responsiveness to affective displays, rather than through a lack of responsiveness to changes in the partner's ongoing behaviour. These effects generalized across several home activities. PPD had selective effects in Hoffman et al. (1991) study of 22 mother-infant dyads at 2 months postpartum. Ratings were made by assessors blind to group assignment. Contrary to prediction, level of maternal stimulation and infant activity did not differ as a function of depression in maternal mood. In support of prediction, PPD mothers were less positive in interaction, affective involvement, and sensitivity, and more variable in behaviour than non-PPD mothers. Limitations of this study include the observational nature of the study, short follow-up, non-use of RDC, and the questionable external validity as the observations were conducted in a laboratory setting.

Table 3-2. Summary of Key Mother-Infant Relationship Articles[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Beck, 1995) USA	19 studies published between 1983 and 1993	Inclusion criteria: 1) study involved measuring the effect of postpartum depression on maternal-infant interaction 2) infants in the studies were 1 year of age or less 3) if the study used an f or χ^2 statistic to analyze the outcome measure, a df = 1 was necessary	Total sample size for the meta-analysis: 829 mother-infant dyads 74% convenience sampling; 26% matched pairs 37% longitudinal; 63% cross-sectional	Mean effect sizes weighted by sample size: - maternal interactive behaviour: 0.68 - infant interactive behaviour: 0.75 - dyadic interactive behaviour: 1.07. The effect of PPD on maternal and infant interactive behaviour alone is medium size, and on dyadic behaviour is large. As the sample size and quality of the studies increased, the effect sizes decreased. This suggests that more rigorous studies show less of an effect of PPD on mother-infant relationships.	Extensive search and rigorous inclusion criteria but most studies conducted in 1980s and most used convenience sampling
(Zlochower et al., 1996) Country: unspecified - author's affiliation: United States Year: unspecified (year of publication: 1996)	Cross-sectional	15 PPD and 20 non-PPD mother-infant dyads; Mothers were participants in an ongoing study of postpartum depression Characteristics: Caucasian, high-school educated, middle class, married, age range: 18-35. Infants born at term, uncomplicated pregnancy and delivery	RDC to identify PPD 3-minute videotape of play interaction (without toys) at 4 months of age. Digital recording of vocal utterances and measurement of "switching pauses," the duration of silence after infant stops vocalizing and mother begins.	Mothers with PPD had sig. longer and more variable switching pauses Suggests that depression negatively affects the mother's ability to coordinate her vocal behaviour	Small sample Requires replication Short follow-up duration precludes conclusion regarding longer-term effects

[1] See Table 3-10 for abbreviations used within tables.

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Murray et al., 1996a) Cambridge, England Infants delivered between February 1986 and February 1998	Prospective	56 PPD and 42 non-PPD mother-infant dyads Characteristics: caucasian, mean age: 28 years (SD=4), 64% upper- to middle-class, 49% with fulltime education of at least 12 years, married or cohabiting Infants 27-42 weeks gestation, mean birth weight 3.47 kg (SD=0.42)	EPDS (by mail) and SPI/RDC to identify PPD 5-minute videotape of play interaction (without toys) at 2 months of age. 18 month assessments of infant cognitive development 18-month Assessments Infant: Bayley Scales of Infant Mental Development, Strange Situation procedure (quality of infant attachment) Maternal: LEDS, SADS-L	PPD women rated less sensitive, expressed fewer infant affirmations and more negations. No difference in degree to which PPD versus non-PPD mothers were intrusive or remote and withdrawn from their infants.	Homogeneous low risk sample Videotaped interactions were brief and highly structured leading to questions of external validity
(Edhborg, Lundh, Seimyr, & Widstroem, 2001) 6 Maternal Health Centres in Stockholm, Sweden 6-month period in 1992-1993	Longitudinal, 15-18 month follow-up	24 PPD and 21 non-PPD mother-infant dyads Characteristics: Swedish-speaking women -- no other sample information	EPDS (by mail) used to assess PPD (RDC not used) Trained observer blind to PPD status coded the videotapes using the Parent-Child Early Relational Assessment scale (PCERA) 5-minute videotape of play interaction at 15-18 months of age in each of 3 situations: 1) structured task 2) free play session 3) separation/reunion intervention Coding variables included maternal emotional availability, maternal negative affect, child quality of play, child negative and positive affect, dyadic mutuality and maternal structuring and mediation.	Free play session: children of high EPDS scorers showed less interest in exploring the environment and also less attention when playing with their mothers than did children of low EPDS scorers. Structured task: high EPDS scoring mothers were significantly less effective than low EPDS scorers at facilitating the child's acquisition of skills and mastery (maternal emotional availability.) Scores on the EPDS were not significantly associated with the children's interaction style.	RDC not used Women's self-report may have yielded a sample of women with mild depressive symptoms over only a short duration.

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Stein et al., 1991) Country: Cambridge, England Year: infants delivered between February 1986 and February 1998	Cross-sectional	49 PPD and 40 non-PPD mother-infant dyads index group: median age 27 (16-40 range), 47% middle class, 92% married or cohabiting control group: median age 27 (17-37 range), 45% middle class, 92% married or cohabiting	Assessments at 19 months of age: 1) 3-5 minute assessment of child's sociability to a stranger; 2) observations of 3-minute play interactions in each of 3 situations: i) with simple toy; ii) with complex toy; iii) with picture book GHQ, PSE, MADRS for assessment of PPD Child's sociability to a stranger assessed based on a semi-standardized procedure devised by Stevenson & Lamb. The child's response to each initiative was rated on a 1-5 scale ranging from withdrawn/distressed to outgoing/friendly. The structured play session was rated within six categories with six 30-second periods At the end of the interview, the blind assessor made global ratings of the mother's behaviour, the child's behaviour and the interactions between mother and child	Children of PPD mothers showed less affective sharing and showed significantly less sociability to strangers. In multivariate analyses taking into account PPD, concurrent maternal depression, as well as chronic social difficulties in the areas of marriage, finances, or housing, low levels of maternal facilitation were significantly predicted most strongly by chronic social difficulties but also by PPD; low levels of affective sharing were predicted by chronic social difficulties, and PPD, but not by concurrent depression; low levels of child sociability with a stranger was predicted by concurrent maternal and not postpartum depression; child distress on mother's departure was predicted by chronic social and marital difficulties and concurrent (but not postpartum) depression; and lack of maternal warmth was significantly predicted by chronic social difficulty only.	Considerable variability in the group of depressed mothers Study made no attempt to assess the effect of child temperament on the mother's depression.

Summary

PPD appears to have salient but selective effects on mother-infant relationships. The numerous coding schemes, short follow-up periods, small number of studies, small sample sizes, samples that are primarily middle class Caucasian women, and usage of primarily observational but not psychophysiological data begs further research prior to forming definitive conclusions. Coding schemes should be validated through psychometric means. The meta-analysis does support medium to large effect sizes of PPD on mother-infant relations in the first year postpartum, however the effect sized decreased as the quality of the studies and sample sizes increased. At 2 months postpartum, the psychophysiological data does support a negative effect of PPD on synchrony of maternal vocal utterances, and observational data support a negative effect of PPD on maternal affective sharing and facilitation of infants, but more variable effects are seen in the longer-term. Therefore, PPD does appear to have negative effects on mother-infant interactions in the first year postpartum, however findings are equivocal beyond one year and are likely variable depending upon other factors such as life adversity or socioeconomic status.

Feeding

A prospective study of 407 infants assessed at 1 week through 14 months of age examined the relation of neonatal sucking to PPD, later feeding, postnatal growth, and feeding practices (Ramsay, Gisel, McCusker, Bellavance, & Platt, 2002). PPD was assessed via the EPDS, and sucking efficiency was measured with a strain-gage device. A maternal report questionnaire assessed infant appetite, frequency of feedings in a day, duration of a typical feeding, and reaction to food textures. Maternal depression did not affect feeding practices, infant feeding abilities, nor child growth. Mothers with PPD were slightly more likely to use compensatory feeding (i.e., change in maternal feeding practice in response to perceived inefficient feeding of the infant). The limitations of this study include non-use of RDC and maternal report of feeding practices, however the strain-gage measurement tool provides the most objective data regarding feeding in the literature.

In detecting the relationship between PPD and early cessation of breastfeeding, Cooper et al. (1993) recruited 356 mothers from both Oxford and Cambridge who were followed longitudinally. PPD was assessed by both self-report measures and a full psychiatric interview. Breastfeeding was measured via semi-structured interview (e.g., whether they had attempted to initiate breastfeeding, any problems, and possible reasons if they had discontinued). Social class, social support, and other obstetric and maternal variables were also assessed. They found that 56% of PPD mothers had given up breastfeeding by 8 weeks postpartum, in comparison to 22.9% of non-PPD mother ($p<.001$). The onset of depression generally preceded weaning. In logistic regression analyses, duration of breastfeeding was significantly predicted by

PPD, lower social class and younger age. Whether breastfeeding is discontinued because of the occurrence of depressive symptoms or because infant feeding difficulties engendered the depression is not clear.

A dissertation examined breastfeeding and maternal depression (Hewat, 1998). Twenty-four mother-infant dyads were recruited, where half of the infants were perceived as problematic breastfeeders by their mothers. Mothers in the problematic breastfeeding group had significantly higher EPDS scores (mean 9.8), than the non-problematic group (mean 5.5). Significantly more mothers in this mildly depressed group had weaned their infants to milk substitutes at three months postpartum. However, one must be cautious as to the direction of this relationship: the feeding problems could have lead to greater depressive symptomatology due to feelings of guilt, failure, or loss of sleep. Moreover, the objectives of this dissertation did not relate to PPD specifically, nor was PPD assessed via RDC.

Table 3-3. Summary of Key Feeding Articles[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Ramsay, 2002) Quebec, Canada	Prospective cohort study	407 healthy singletons Mothers mean age 30.5, avg 14 yrs education, 43% born in Canada	EPDS Strain-gage device Maternal report questionnaire assessed infant appetite, frequency of feedings in a day, duration of a typical feeding, and reaction to food textures.	Maternal depression did not affect feeding practices, infant feeding abilities, nor child growth. Mothers with PPD were slightly more likely to use compensatory feeding.	Non-use of RDC Maternal report of feeding practices, however the strain-gage measurement tool provides the most objective data regarding feeding in the literature.

Summary

Few studies focus on feeding and PPD, considering that feeding is an interactive period of early communication and social integration. The studies outlined above are limited by their use of maternal report of feeding behaviour. However, these studies suggest that PPD may affect compensatory feeding practices of the mother. PPD may also lead to early termination of breastfeeding. However the reverse could be true: difficult infant behaviours may affect a mother's depressive state, and thus breastfeeding may be compromised. Finally, the objective evidence as measured by strain-gage device suggests that PPD does not affect infant feeding ability, although this finding requires replication. The literature regarding non-organic failure to thrive (not reviewed here) presents another perspective on infant feeding practices. In summary, there is insufficient evidence at present to be confident that PPD does not affect feeding ability.

[1] See Table 3-10 for abbreviations used within tables

PPD and Child Growth and Development

Sudden Infant Death Syndrome (SIDS)

An epidemiological study conducted in the UK examined the factors associated with SIDS, by prospectively following all births (N= 32 984) registered in Sheffield during the five-year period from May 1993 to June 1998 (Sanderson et al., 2002). Sociodemographic, obstetric, and neonatal data were collected from the birth notification database. All infants were visited at home 1 month postpartum, at which time the mother completed the EPDS. In multivariate analyses, a high EPDS (OR=3.2), maternal smoking (OR=7.24) and residence in an area of poverty (OR=2.3) were all independent predictors of an increased risk of SIDS. A high EPDS score and, by implication, postnatal depression, may be a risk factor for SIDS, however, there are many possible explanations for the association, and these relationships require further study.

Table 3-4. Summary of Key SIDS Article[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Sanderson et al., 2002) Sheffield, England Five-year period from May 1993 to June 1998	Prospective	All births registered during a five-year period	Sociodemographic, obstetric, and neonatal data was collected from the birth notification database. All infants were visited at home 1 month postpartum, at which time the mother completed the EPDS	High EPDS (OR=3.2), maternal smoking (OR=7.24) and residence in an area of poverty (OR=2.3) were all independent predictors of an increased risk of SIDS.	High rate of missing data EPDS not validated with psychiatric interview EPDS administered 4 weeks post-partum, whereas standardization data were gathered at 6 weeks.

Emotional / Affective Development

Some theorists contend that frontal brain activity patterns (as measured by electroencephalograph; EEG) may be a biological marker for symptoms associated with depression. A cross-sectional study of 38 mothers (n=18 depressed based on diagnostic interview schedule) and their 10-month old infants examined EEG during the experience of different emotions (Jones, Field, Fox, Davalos, & Gomez, 2001). All mothers were low SES, and 68% were African American. After interviewing the mothers, infants were seated in front of a video monitor showing a Sesame Street song with three 10-second segments embedded displaying the actress looking happy, sad, or neutral. In addition, the mother was asked to play a peek-a-boo game with her infant, and then a stranger entered the room. The infants' positive, negative, and neutral expressions were recorded, as was latency to cry during the stranger protocol. Multivariate analyses of variance with post hoc t-tests

[1] See Table 3-10 for abbreviations used within tables

indicated that during the happy film, mother-infant peek-a-boo, and stranger interaction conditions, infants of the PPD mothers showed more negative affect than control infants. Latency to cry was shorter and intensity of crying was higher among infants of PPD versus non-PPD mothers. Moreover, infants of the depressed mothers exhibited greater relative right frontal EEG asymmetry compared to the infants of the non-depressed mothers during play with their mothers. Overall, infants of depressed mothers showed more negative and less positive expressions than 10-month old infants of non-depressed mothers. The small sample size and preliminary nature of this study invites replication before definitive conclusions can be reached.

A longitudinal study of infant temperament in a Japanese population suggests that PPD can effect infant emotion up to 6 months postpartum, but not 18 months (Sugawara, Kitamura, Toda, & Shima, 1999). A large sample of 1329 women was recruited, and self-reported depression at 5 days and 12 months postpartum was collected with the Zung Depression Self-Rating (ZDSR) scale. Maternal report of infant temperament at 6 and 18 months postpartum was factor analyzed into 5 components: fear of strangers and strange situations, frustration tolerance, rhythmicity (i.e., feeding and sleeping consistency), attention span and persistence, and audio-visual sensitivity. Maternal depression at 5 days postpartum significantly correlated with maternal depression at 12 months, and infant temperament at 6 months (rhythmicity, frustration tolerance, persistence), and at 18 months (rhythmicity, persistence). The researchers conducted a path analysis to tease out the effects of postpartum versus recurrent depression. They supported the relationship between postpartum and recurrent depression, and showed a lack of effect of PPD on infant temperament at 18 months. PPD only had an effect on infant temperament at 6 months. Caution is warranted given that infant temperament was not assessed independently, but by maternal-report only. Moreover, postpartum depressive symptomatology was assessed as a continuous variable only, so that analyses did not specifically compare PPD versus non-PPD mothers.

Table 3-5. Summary of Key Emotional Development Articles[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Jones, 2001) Country: USA Year: unspecified (year of publication: 2001)	Cross-sectional	38 mothers (n=18 PPD) and their 10-month old infants mean age: 28.2 (SD=5.5) 68% African American	EEG CES-D and Diagnostic Interview Schedule Coding of infant and maternal affect: % of time displaying positive, negative and neutral affect. Latency to cry	Infants of the PPD mothers showed significantly more negative affect than control infants. Latency to cry was significantly shorter and intensity of crying was higher among infants of PPD versus non-PPD mothers. Infants of the depressed mothers exhibited significantly greater relative right frontal EEG asymmetry compared to the infants of the non-depressed mothers during play with their mothers.	Results may only be generalizable to lower income and African American families Infant's seemingly negative responses could serve a protective function to elicit attention from other care providers Requires replication with longitudinal prospective design

[1] See Table 3-10 for abbreviations used within tables

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Sugawara et al., 1999) Country: Kawasaki, Japan Year: registration of original participants Aug 1984-Feb. 1986	Longitudinal study: 6 and 18 month postpartum infant assessment; 5 day and 12 months postpartum maternal self-report.	1329 women recruited from general hospital mean age: 27.9 years (SD=4.2) 35% university graduates	SDS used to measure severity of depression at 5 days and 12 months postpartum. Maternal report of infant temperament at 6 and 18 months postpartum using the RITQ and the TTS was factor analyzed into 5 components: fear of strangers and strange situations, frustration tolerance, rhythmicity (i.e., feeding and sleeping consistency), attention span and persistence, and audio-visual sensitivity.	Maternal depression at 5 days postpartum significantly correlated with maternal depression at 12 months, infant temperament at 6 months (rhythmicity, frustration tolerance, persistence), and at 18 months (rhythmicity, persistence). A path analysis supported the relationship between PPD and recurrent depression, but showed a lack of effect of PPD on infant temperament at 18 months. PPD only had an effect on infant temperament at 6 months.	Maternal-report of infant temperament Maternal depression was treated as a continuous variable in this study: a replication study using direct interviews and psychiatric diagnoses is required. Caution is warranted given that infant temperament was not assessed independently, but by maternal-report only.

Summary

The minimal studies in this area support an early effect of PPD on infant affect, so that infants display less positive and more negative facial expressions in response to standard and variable stimuli when compared to infants of mothers without PPD. However, more longitudinal effects on emotional development past ten months postpartum have not been assessed. The studies in this area are few, rely heavily on self-report, and are limited by select samples (i.e, African American and Japanese), thereby resulting in a weak base of evidence. Murray will be analyzing data regarding the relationship between PPD and child emotional development up to the early teenage years in her cohort (Murray, 2002), which should provide further answers in this domain.

Attachment and Social Functioning

John Bowlby originally sought to identify individual differences in the quality and nature of attachment. Mary Ainsworth devised a laboratory procedure known as the 'Strange Situation' to identify patterns of attachment (Ainsworth et al., 1978; Ainsworth et al., 1969). In this procedure, the caregiver and the infant enter a playroom, in which the child is free to explore. Then, in a series of steps, the infant is exposed to a strange adult with and without the mother present, is left alone briefly, and is reunited with the mother. Ainsworth postulates three types of attachment that are displayed in response to this protocol.

Infants that are securely attached (approximately 70% of infants) show a good balance between play and exploration on the one hand and seeking proximity to the caregiver on the other. The caregiver is a secure base for exploration, and the infant shows a readiness to separate to explore toys, affective sharing during play, and affiliation to the stranger in the mother's presence. The infant is readily comforted when distressed such that the she/he returns to play. Moreover, the infant distress is easily terminated by contact with the caregiver. Anxiously resistant attachment is characterized by a lack of exploration. These infants have difficulty separating to explore, may need contact even prior to separation, and are wary of novel situations and people. Upon reunion with a caregiver, they would have difficulty settling, as evidenced by continued crying and fussing, passivity, or even contact resistance. Finally, anxious avoidant attachment is characterized by independent exploration (i.e., ready separation to explore, little affective sharing, and affiliation to the stranger), and active avoidance upon reunion (i.e., the infant turns, looks or moves away, and does not avoid the stranger). These last 2 types of attachment are also referred to as insecure attachment styles.

In the study outlined above by Murray et al. (1996a) data were analyzed with respect to the effects of PPD and life adversity on attachment at 18 months postpartum, as measured by Ainsworth's Strange Situation procedure. Overall rates of insecure attachment were 62% among PPD dyads, and 26% for controls. There was no effect of concurrent (i.e., 18-month) maternal depression on attachment, but life

adversity did appear to play a role. In regard to the effect of PPD specifically, attachments were found to be more likely to be insecure whether or not the mother had experienced life adversity. PPD was estimated to increase the odds of insecure attachment by a factor of 3.8, over and above the increase due to maternal life adversity. Moreover, compared with control group infants, the odds of insecure attachment were 5.4 times greater in the PPD group, 5.4 times higher in the previous history only group, and 9.8 times higher in the previous and postpartum depression group (Murray, 1992). Although PPD and past history of depression each independently contribute to insecure attachment, these factors together almost double the rate. Limitations of this study include the select sample of relatively high SES mothers.

Another more recent study as outlined above by Edhborg et al. (2001) also reports on an 18-month follow-up, but used a less distressing separation procedure based loosely on Ainsworth's Strange Situation. More children of low EPDS scorers displayed a secure and joyful attachment toward their mothers than did the children of high EPDS scorers. The children of high EPDS scorers demonstrated a restriction of joy and pleasure in their reunions with their mothers.

Table 3-6. Summary of Key Infant Attachment Articles[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Murray, 1996) Country: Cambridge, England Year: infants delivered between February 1986 and February 1998	Prospective	56 PPD and 42 non-PPD mother-infant dyads Characteristics: caucasian, mean age: 28 years (SD=4), 64% upper- to middle-class, 49% with fulltime education of at least 12 years, married or cohabiting Infants 27-42 weeks gestation, mean birthweight 3.47 kg (SD=0.42)	EPDS (by mail) and SPI/RDC to identify PPD 18 month assessment with Ainsworth's Strange Situation procedure.	Overall rates of insecure attachment were 62% among PPD dyads, and 26% for controls. PPD was estimated to increase the odds of insecure attachment by a factor of 3.8, over and above the increase due to maternal life adversity.	Small sample size Sample characteristics homogeneous and only generalizeable to relatively high SES white mothers.
(Edhborg, Lundh, Seimyr, & Widstroem, 2001) Stockholm, Sweden 6-month period in 1992-1993	Longitudinal, 15-18 month follow-up 5-minute videotape of play interaction at 15-18 months of age in each of 3 situations: 1) structured task 2) free play session 3) separation/ reunion intervention	24 PPD and 31 non-PPD mother-infant dyads recruited from 6 Maternal Health Centres Characteristics: Swedish-speaking women	EPDS (by mail) used to assess PPD (RDC not used) Trained observer blind to PPD status coded the videotapes using the Parent-Child Early Relational Assessment scale (PCERA) 5-minute videotape of play interaction at 15-18 months of age in each of 3 situations: 1) structured task 2) free play session 3) separation/reunion intervention Coding variables included maternal emotional availability, maternal negative affect, child quality of play, child negative and positive affect, dyadic mutuality and maternal structuring and mediation.	Children of low EPDS scorers displayed a significantly more secure and joyful attachment toward their mothers than did the children of high EPDS scorers. The children of high EPDS scorers demonstrated a restriction of joy and pleasure in their reunions with their mothers.	RDC not used Women's self-report may have yielded a sample of women with mild depressive symptoms over only a short duration. Limited information regarding sample characteristics Used a variation on Ainsworth's protocol

[1] See Table 3-10 for abbreviations used within tables

Summary

The literature supports an effect of PPD on infant attachment up to 18 months postpartum. Specifically, infants of PPD mothers more often display insecure (i.e., avoidant or anxious attachment), whereas infants of non-PPD mothers more often display secure attachment. This holds true after controlling for life adversity and concurrent depression, although there is some evidence of impact of a history of depression. One study shows that the odds are 5.4 times higher for 18-month old infants of PPD mothers to display insecure attachment compared to infants of non-PPD mothers. The studies outlined above would benefit from replication with larger more heterogeneous samples and longer follow-up intervals.

Physical Development

Recently, Patel (2003) published a cohort study examining the relationship between PPD as assessed by the EPDS, and infant weight and length. One hundred and eighty-one infants from Goa, India were weighed and measured at 6-8 weeks postpartum, and followed up at 6 months postpartum. Weight for age and length for age percentiles were computed, and infants who fell below the 5^{th} percentile for age were considered to be underweight or short for age respectively. After controlling for other variables which influence infant growth, PPD was a strong and independent predictor of low weight and length. PPD was significantly associated with being underweight at six months (30% versus 12%) and with being short for age (25% versus 8%).

The study outlined above in the section regarding feeding also measured effect on child growth (see Table 3-3). This was a prospective study of 407 infants assessed at 1 week of age through 14 months measuring sucking efficiency (Ramsay et al., 2002). PPD was assessed via the EPDS. PPD did not affect child growth as assessed by weight, recumbent length, nor head circumference.

Table 3-7. Summary of Key Physical Development Article[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Patel, DeSouza, & Rodrigues, 2003) Country: Goa, India Year: unspecified (year of publication: 2003)	Cohort study to test growth outcome hypothesis; nested case-control study of developmental outcomes	Consecutive babies whose mothers were participating in a study of PPD and who were brought to the district hospital immunization clinic at 6-8 weeks. 181 babies; 37 mothers with PPD Average maternal age: 26 (range 18-37) All low SES	PPD established by EPDS (in Konkani) Outcomes measured at 6 months by maternal interview: presence of antenatal and postnatal depression, obstetric history, economic and demographic characteristics, and gender-based variables (preference for male infant, presence of marital violence).	Compared with controls, infants of mothers with PPD were 2.3 times more likely to be underweight and 2.9 times to be shorter at 6 months of age than controls Developmental quotient was lower than 85 in 44% of infants of mothers with PPD compared with 20% in the controls Odds for poor development in the study group remained greater than 3 even after accounting for confounding variables like birth weight and maternal education	Non-representative sample Mothers choosing private health care not included Maternal IQ (which has a direct bearing on developmental outcomes) was not studied Relatively small sample size.

Summary

Clearly the results of these two studies (Patel, DeSouza & Rodriguez, 2003; Ramsay, 2002) are in contradiction (see Tables 3-3 and 3-7). The first study was conducted in a low socioeconomic status sample, in a developing country. Its methods are strong, with the prospective nature of the study demonstrating a relationship between PPD 6-8 weeks postpartum on physical growth at 6 months. The second study consisted in a larger sample recruited from a developed country with a longer 14 month follow-up, and found no significant affects on child growth. Both studies assessed PPD with first-language versions of the EPDS. Clearly replication is needed using RDC, but it may be postulated that the effect of PPD on physical growth takes longer than 6 months to show an effect, or that PPD may not be aversive in developed countries where it may be in underdeveloped ones (e.g., access to food). There may be other unassessed confounding variables which affect the relationship between maternal feeding practices and child growth. It may be tentatively concluded that PPD may have an impact on physical development, but more research is required.

[1] See Table 3-10 for abbreviations used within tables

Cognitive Development: IQ and Language

A meta-analysis by Beck (1998) reviewed the effects of PPD on child cognitive development and behaviour in children (n= 1473) from 1 to 14 years of age (see Table 3-8). She reviewed 9 studies, 4 of which controlled for concurrent maternal depression. Outcome measures assessing cognitive development consisted of the McCarthy Scales and Piaget's object concept tasks. Child behaviour (see section below) was analyzed by the Child Behaviour Check List. Unfortunately, all outcomes were grouped together for the purposes of Beck's analyses. A longitudinal design was used in all but one study, convenience sampling was used in 6 studies, random sampling in 2 studies, and matching was used in one study. In the four studies which controlled for recurrent depression, the mean weighted effect size was d=.30 when controlling for sample size, and d=.34 when controlling for methodological rigour. Based on convention, these are considered small effects. Moreover, studies in the meta-analysis which had larger sample sizes showed smaller effects on child behaviour and cognition, suggesting that when there is more power there is a smaller effect. Beck did a thorough search using strict inclusion/exclusion criteria, however the amalgamation of outcomes poses problems in interpretation of effects.

Murray has published 5 studies concerning child cognitive development in particular, using this same cohort as outlined in the introduction. The first study (Murray, 1992) examined the effect of PPD on Piaget's object concept task[2] at 9 and 18 months, and the Bayley (measures memory, language, and problem-solving abilities, as well as gross and fine motor control and coordination; Bayley, 1969) and Reynell (measures language comprehension and expressive language) scales at 18 months. Infants of mothers with PPD only were more likely to fail the object concept task at 9 months, and infants of mothers with PPD or a previous history of depression were more likely to fail at 18 months than the control infants. There was a tendency for girls to outperform boys, and for an effect of maternal education and marital friction on outcome. There was no effect of depression on the Bayley or Reynell scores, but social class was a significant factor. Thus, lower social class had negative effects on language and mental development. The duration and severity of depression had no effect.

The second study reports on a comparison of mother's speech to their infants during play interactions at 2-3 months postpartum and effect on cognitive development at 9 and 18 months, controlling for sex of the infant, between three (not 4) experimental groups: (1) 29 PPD mothers, (2) 10 mothers with a psychiatric history of depression pre, but not post-natally, and (3) 20 control mothers without pre or postnatal depression (Murray et al., 1993). EPDS and a standardized psychiatric interview were used to assess depressive

[2] Piaget's object concept refers to the development of a cognitive understanding of the permanence of objects between birth and 2 years of age. The main development during this stage is the understanding that objects exist and events occur in the world independently of one's own actions. The typical test for object permanence is some form of 'Search Task', where an object is hidden and the child then tries to find it. If the child successfully finds the object, this demonstrates that the child can now cognitively represent the existence and position of an invisible object

symptomatology. A 5-minute infant and mother play period was video-recorded and coded based on complexity of maternal speech (i.e., length of utterance, incidence of complete repetitions, continuity of reference), syntax, and reciprocity (i.e., infant, mother or other-focused utterances). The Bayley scales of mental development, and Piaget's object concept tasks were administered at 9 and 18 months. Multiple regression analyses were used to test whether maternal communication could be mediating the relationship between PPD and cognitive development after controlling for the effects of infant gender, and maternal SES. The results suggest that infant-focused speech may have had a more direct influence on the 9-month cognitive outcome, with performance at 9 months then predicting the 18-month outcome (with girls showing more improvement between the two assessments than boys). The significant interaction term shows that the speech of PPD mothers who had male infants was much less infant-focused than that of the mothers in other groups, and displayed more negative affect. After excluding mothers who had recurrent depression, higher infant-focus of maternal speech at two months was strongly associated with higher scores on the Bayley scales at 18 months. Although maternal depression was not significantly associated with object concept at 9 months, significant effects were found at 18 months. Infants of non-PPD mothers had a higher success rate than infants of PPD mothers, and female infants had a higher success rate than male infants on object concept tasks.

The third article by Murray et al. (1996a) (see Table 3-2) examined the interaction of life adversity, sex of infant, and PPD on child cognitive development at 18 months. There was no effect of PPD on child cognitive development, even when taking into account maternal life adversity. However, when the relationship between PPD and cognitive development was examined based on sex of the child, results showed that boys of PPD mothers performed significantly worse on the Bayley scales than did boys of non-PPD mothers. For girls, there was no significant effect.

The fourth study followed up the same sample at 5 years (Murray et al., 1996b). Assessments included the SADS, the McCarthy Scales of Children's Abilities (McCarthy, 1972), an assessment of the home environment by a researcher blind to condition, and a videotape of mother-child interaction during the sharing of juice and cake. No relationship was found between any measure of maternal depression (i.e., time of depression, length of child exposure to maternal depression, or the recency of exposure) and the children's performance on the cognitive tasks. However, poorer cognitive functioning was predicted by early experience of insensitive maternal interaction, stimulation at home, social class, and for boys the number of months in school.

The final study to be reviewed using the Murray cohort, presents teacher ratings of child behaviours at 5 years of age (Sinclair et al., 1998). Teacher ratings at 5 years included the Adjustment to School Questionnaire (general readiness for school and personal maturity factors), the Prosocial Behaviour Questionnaire (e.g., helping, sharing), the Temperament Assessment Battery for Children (activity level,

intensity of emotion, distractibility), and the Preschool Behaviour Checklist (emotional difficulties, conduct problems, concentration, social relations). PPD was not related to readiness for school, personal maturity, prosocial behaviour, adaptability, emotional intensity, nor persistence. However, variables such as recent maternal depression, child sex, and social class were related in bivariate analyses. However, there were interactions of PPD with infant sex and social class on two temperament indices of activity, distractibility, as well as behavioural disturbance. For instance, in boys the occurrence of maternal PPD was associated with higher scores on the activity scale, whereas the scores of girls of PPD mothers were similar to those of control children. In regard to distractibility, boys from lower SES with PPD mothers were judged the highest in this domain, but among girls distractibility was related to low SES and non-PPD mothers. Finally, with regard to behavioural disturbance, boys of PPD mothers scored high, the girls of PPD mothers scored low, and control group boys and girls had similar intermediate scores.

Hay and colleagues (Hay & Kumar, 1995; Sharp et al., 1995) followed 204 socio-economically disadvantaged families until the children were almost four years of age and explored contextual factors regarding PPD and child cognitive development. In the final sample, an index group of 60 children whose mothers were clinically depressed in the first year postpartum, and 75 children whose mothers were depression-free during the same time period were studied. Four interviews were conducted with mothers pre and post-natally. Assessments included McCarthy Scales of Children's Abilities, videotape of mother-child interaction with an Etch-A-Sketch, the HOME inventory, and the researchers completed the Tester's Rating of Child Behaviour. Maternal assessments included the Weschler Adult Intelligence Scale- Revised (WAIS-R) for IQ, a questionnaire about marriage, and the Child Behavior Checklist (CBCL). Paternal measures included lifetime psychiatric history, IQ, views about the marriage, and assessment of child's behaviour problems. A clinical interview schedule was used to diagnose depression. Results showed that boys of PPD mothers scored significantly more poorly on the perceptual, motor and verbal subscales than girls, or children of non-PPD mothers. This effect was specific to boys whose mothers were depressed in the first year postpartum, and not in years two or three. This difference in cognitive ability based on PPD remained significant after controlling for such confounding factors as behavioural problems (maternal and paternal report), birth weight, maternal and paternal IQ, family climate, home environment, mother-child interaction with the Etch-A-Sketch, and breastfeeding during infancy. Although some of these factors did reliably predict boy's cognitive development, they did not remove the effect of PPD. In multivariate analyses entering maternal IQ, social class, home environment and mother-child attunement before PPD, PPD remained a reliable predictor of child cognitive development, as did the home environment and mother-child attunement (Sharp et al., 1995). A re-analysis of this data provided support for the association between PPD and boys' cognitive delay, but showed that low birth weight infants and infants of less educated mothers are most at risk of cognitive developmental delay.

Another longitudinal study with a Bavarian sample and a follow-up at seven years partially support the findings outlined above (Kurstjens & Wolke, 2001). A representative sample of 1329 mothers and their singleton offspring, randomly selected with stratification based on gender, SES and neonatal risk, were assessed with research diagnostic criteria. Ninety-two mothers had diagnosed PPD, and 721 mothers served as controls. Features of maternal depression measured included timing, recency, severity, number of episodes, duration, and severity/chronicity. Child cognitive ability was measured by the Griffiths Scales of Babies' Abilities at 20 months, the Columbia Mental Maturity Scales at 4 years and 8 months, and the Kaufman Assessment Battery for Children at 6 years 3 months. There was no effect of PPD on cognitive development at 20 months, 4 years 8 months, nor 6 years 3 months, nor were there significant interactions by gender, SES, and birth risk. In fact at the last measurement point, there was no effect of timing, recency, severity, duration, or number of depressive episodes. However, chronicity of depression did interact with sex of child and neonatal risk (3-way interaction), such that boys of chronically depressed mothers of low SES families showed the lowest cognitive scores compared to boys of chronically depressed mothers in upper SES families, or boys and girls of the control group of any SES status.

In a large community study by Brennan et al. (2000) following close to 5,000 children and mothers (see child behaviour section below for more methodological detail), child cognitive functioning was operationalized with the Peabody Picture Vocabulary test (Dunn & Dunn, 1981). This test is a standardized measure of vocabulary development that does not rely on expressive language skills. Vocabulary development score did not significantly relate to timing of maternal depression, but was related to severity and chronicity. Thus PPD is not playing a role here, but likely maternal education and chronic and severe depression have a large influence.

Table 3-8. Summary of Key Cognitive Development Articles[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Beck, 1998) USA	9 studies published between 1978 and 1995	Inclusion criteria: 1) study involved measuring the effect of postpartum depression on the behavior and/or cognitive development of children over 1 year of age 2) adequate statistics were included in the findings of the research to permit meta-analytic calculations 3) if the study used an F or χ^2 statistic to analyze the effect of postpartum depression on children's development, a df = 1 was necessary	Total sample size for the meta-analysis: 1473. 8 longitudinal design studies 6 convenience sampling; 2 random sampling; 1 matching	Outcome measures included: CBCL, Piaget's object concept tasks, Reynell scales, McCarthy scales, Junior Eysenck Personality Questionnaire In the four studies which controlled for recurrent depression, the mean weighted effect size was d=.30 when controlling for sample size, and d=.34 when controlling for methodological rigour Small effects Studies in the meta-analysis which had larger sample sizes showed smaller effects on child behaviour and cognition, suggesting that the tighter designs are showing a smaller effect	Too many outcomes were grouped together. Although the meta-analysis reported a small effect size, that outcome might best be attributed to the cognitive factors assessed (i.e., McCarthy Scales, Piaget's object concept tasks) Children's age range was 1-14 years and there are many factors that can affect child functioning during such a broad span of time.

[1] See Table 3-10 for abbreviations used within tables

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Murray, 1992) Cambridge, England Feb. 1986 – Feb. 1988	Longitudinal, 18 month follow-up	Women presenting on the postnatal wards of the maternity hospital were approached and invited to participate in a study of the experience of motherhood on infant development 113 mother-infant dyads recruited: 111 assessed at 18 months; random subsample was seen at 2-3 month intervals	Maternal Measures: EPDS, SPI, RDC to assess PPD SADS-L, Infant measures: Piaget's object concept task at 9 and 18 months, and the Bayley and Reynell scales at 18 months	Infants of mothers with PPD only were more likely to fail the object concept task at 9 months, and infants of mothers with PPD or a previous history of depression were more likely to fail at 18 months than the control infants. There was a tendency for girls to outperform boys, and for an effect of maternal education and marital friction on outcome. There was no effect of depression on the Bayley or Reynell scores, but social class was a significant factor. Thus, lower social class had negative effects on language and mental development. The duration and severity of depression had no effect.	Unclear what the relative contributions of mother and infant might be to impaired patterns of engagement. Reasons for gender differences in outcome unclear: need to examine whether infant behavior provokes different patterns of maternal response Details of how social class interacts with maternal emotional state to influence infant development remains to be determined.

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Murray et al., 1993) Country: Cambridge, England 1986 – 1988	Prospective	Subjects drawn from large representative community sample of women aged 20-40 years 29 PPD mothers, 10 mothers with a history of depression pre, but not post-natally, and 20 control mothers without pre or postnatal depression	Bayley scales of mental development, and Piaget's object concept tasks were administered at 9 and 18 months 5-minute infant and mother play period was video-recorded and coded based on complexity of maternal speech (i.e., length of utterance, incidence of complete repetitions, continuity of reference), syntax, and reciprocity (i.e., infant, mother or other-focused utterances).	Infant-focused speech had a more direct influence on the 9-month cognitive outcome, with performance at 9 months then significantly predicting the 18-month outcome (girls showing more improvement between the two assessments than boys). Speech of PPD mothers who had male infants was significantly less infant-focused than the mothers in other groups, and displayed more negative affect. Higher infant-focus of maternal speech at two months was significantly associated with higher scores on the Bayley scales at 18 months. Maternal depression was not significantly associated with object concept at 9 months, significant effects were found at 18 months. Infants of non-PPD mothers had a higher success rate than infants of PPD mothers, and female infants had a significantly higher success rate than male infants on object concept tasks.	No assessment of neonatal temperament Possible role of infant variables not examined Homogeneous, low risk sample of mothers

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Murray et al., 1996b) Cambridge, England Feb. 1986 – Feb. 1988	Longitudinal, 5-year follow-up	100 mother-infant dyads originally recruited from all primiparous mothers on the postnatal wards of a maternity hospital; 98 dyads assessed at 18 months; 95 dyads assessed at 5 years	EPDS, SPI, RDC to assess PPD SADS-L, the McCarthy Scales of Children's Abilities, an assessment of the home environment by a researcher blind to condition, and a videotape of mother-child interaction during the sharing of juice and cake	No relationship was found between any measure of maternal depression and the children's performance on the cognitive tasks. Nor was cognitive outcome related to the length of child exposure to maternal depression, or the recency of exposure. However, poorer cognitive functioning was predicted by early experience of insensitive maternal interaction, stimulation at home, social class, and for boys the number of months in school	Sample may not be representative of overall population (being drawn from a relatively low risk population)

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Sinclair et al., 1998)	Prospective longitudinal, 5-year follow-up	Recruitment as for (Murray, 1992) 58 PPD mothers and 42 well mothers were initially recruited; 56 index and 42 controls assessed at 18 months; 55 index and 40 control assessed at 5 years	Maternal: SPI with RDC; SADS-L (18 months and 5 years); LEDS; DAS Teacher Ratings: ASQ; PBQ; TABC; PBCL	There was an interaction of PPD with infant sex and social class on two temperament indices of activity, distractibility, as well as behavioral disturbance. In boys the occurrence of PPD was associated with higher scores on the activity scale, whereas the scores of girls of PPD mothers were similar to those of control children. In regard to distractibility, boys from lower SES with PPD mothers were judged the highest in this domain, but among girls distractibility was related to low SES and non-PPD mothers. Finally, with regard to behavioral disturbance, boys of PPD mothers scored high, the girls of PPD mothers scored low, and control group boys and girls had similar intermediate scores. PPD was not related to readiness for school, personal maturity, prosocial behaviour, adaptability, emotional intensity or persistence.	Lack of a non-PPD pathological control group limits the extent to which one can argue for a specificity of effect The optimal performance of girls of depressed mothers may mask psychological problems that were not assessed Although an association between postnatal depression and difficulties in boys' adjustment to school has been found, the mechanisms underlying it have not been determined

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Hay et al., 1995) (Sharp et al., 1995) London, Great Britain Women pregnant between 1 January and 31 December 1986	Longitudinal: 4 year follow-up	60 index children and 75 controls assessed up to 4 years of age socioeconomically disadvantaged	RDC for depression (early pregnancy, 12 and 52 weeks postpartum; WAIS-R, GHQ, GRIMS, CBCL Child: McCarthy Scales of Children's Abilities, videotape of mother-child interaction with an Etch-A-Sketch, the HOME inventory, Tester's Rating of Child Behavior.	Children whose mothers were depressed in the first year post-partum had sig. lower GCI scores than did mothers who were not depressed. Neither depression during pregnancy nor at the time of the 4-year assessment sig. affected the children's cognitive performance. Boys of PPD mothers scored significantly more poorly on the perceptual, motor and verbal subscales than girls, or children of non-PPD mothers. (specific to boys whose mothers were depressed in the first year postpartum) In multivariate analyses entering maternal IQ, social class, home environment and mother-child attunement before PPD, PPD remained a sig. predictor of child cognitive development, as did the home environment and mother-child attunement	Sample may not be representative of the overall population
(Kurstjens et al., 2001) South Bavaria, Germany Children born between 1 Feb. 1985-31 March 1986	7-year longitudinal	1329 mothers and their singleton offspring - randomly selected with stratification based on gender, SES and neonatal risk 92 mothers had diagnosed PPD, and 721 mothers served as controls.	Maternal: SADS, RDC, DSM-IV, depression characterized by timing, recency, severity, number, duration and severe-chronically depressed group Child cognitive status: Griffiths Scales of Babies' Abilities (20 months), CMM (4 years and 8 months) , K-ABC (6 years and 3 months), MPC, AS.	There was no effect of PPD on cognitive development at 20 months, 4 years 8 months, nor 6 years 3 months, nor were there significant interactions by gender, SES, birth risk. Three-way interaction effect on cognitive outcome of PPD by infant gender and by SES	Confirmation of a gender difference between girls and boys awaits analysis of data in a larger, representative sample

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Brennan et al., 2000) Children born between 1981 and 1984 in Queensland, Australia	Prospective Community cohort followed for 5 years	4,953 children born at the Mother's Hospital low socioeconomic sector, mostly Caucasian	Interviews and questionnaires at 3-4 days post-partum, 6 months and 5 years Maternal: Delusions-Symptoms-States Inventory (self-report), BDI Child: CBCL, Peabody Picture Vocabulary Test	Vocabulary development score did not significantly relate to timing of maternal depression, but was related to severity and chronicity. Postpartum depression did not relate to child behavior, only moderate levels of maternal depressive symptoms at 6 months or 5 years were significantly related to child behavior at 5 years. Severity and chronicity of depressive symptoms did relate to child behavior.	Sample may not be generalizable to overall population Maternal report of child behavior

Summary

The strongest study on long-term effects of PPD on the infant found children of PPD mothers performed significantly less well on cognitive tasks at 18 months than did children of non-PPD mothers, especially the boys. In summary of Murray's work with her longitudinal sample, the 18-month outcome on the Bayley mental development index was predicted by PPD in interaction with infant gender (the performance of boys of PPD mother was particularly poor), and this effect was mediated by maternal interactions with the infant, reflected in the quality of maternal speech. While 18-month cognitive outcome was also predicted by the extent of the infant's active communication with the mother, this association was found only because the infant's behaviour was associated with the quality of maternal interaction, indicating that the mother's contribution to infant cognitive development was quite important. At 5 years, there was no evidence of an adverse effect of PPD on cognitive functioning, even amongst vulnerable subgroups of children. However, Sinclair and Murray found the 5 year old children of PPD mothers were significantly more likely than controls to be rated by their teachers as behaviorally disturbed (Sinclair et al., 1998). Caution is warranted given that the results of the plethora of studies utilizing this same select sample do not concur with findings from other samples.

The literature relating PPD to cognitive development is the most developed of all areas presented in this chapter. Researchers have done a commendable job at operationalizing life adversity and contextual factors which may mediate the relationship between PPD and language and IQ development in children up to the age of 7. It appears that PPD is related to other factors which negatively affect cognitive development, including male sex, social adversity and maternal depression. The meta-analysis combining the outcomes of

cognitive development and child behaviour supported a small effect of PPD, however by combining these outcomes we cannot draw specific conclusions. Longer-term findings (5 years) seem to be equivocal at best.

Child Behaviour

Child behaviour is generally assessed through maternal report on the Child Behaviour Checklist (CBCL; Achenbach, 1992). The CBCL consists of 118 behavioural items that assess difficulties a child may exhibit, reflecting phenomena such as depression, withdrawal, hyperactivity, and aggression. A parent is asked to rate their child's behaviour during the previous 6 months on a dimensional scale from 0 (not true) to 2 (very true). Behaviours are summated in two subscales: internalizing and externalizing behaviours. Test-retest reliability is stable, concurrent validity demonstrated, and norms are available (mean score of 50 and standard deviation of 10).

A prospective study following women and their children for 4.5 years calls into question direct effects of PPD on child behaviour (Philipps & O'Hara, 1991). Seventy mainly Caucasian, married, American mothers and their children were assessed 4.5 years after birth with the BDI, an RDC semi-structured interview, self-report of maternal social adjustment, and the CBCL. Ten of the women had experienced PPD. Results show that the children's behavior was close to the norm, regardless of previous maternal PPD. PPD was directly related to subsequent maternal depression. Only concurrent depression was related to child behaviour problems at 4 and a half years. Limitations of this study include a small homogeneous sample size (particularly the low number of PPD mothers) and maternal report of child behaviour.

A more recent study examining effect of PPD on child behaviour at 5 years distinguished among chronicity, severity, and timing of maternal depressive symptoms (Brennan et al., 2000; see Table 3-9). A community cohort of 4,953 children were followed, and mothers provided self-reports of depressive symptoms during pregnancy, 3-4 days postpartum, 6 months and 5 years later via the BDI and the Delusions-Symptoms-States Inventory. Child behaviour was assessed with the CBCL. Postpartum depression did not relate to child behaviour, however moderate levels of maternal depressive symptoms at 6 months or 5 years were significantly related to child behaviour at 5 years. Severity and chronicity of depressive symptomatology were significantly related to poorer child behaviour.

Child behaviour at 5 years postpartum was also examined in Murray's cohort (1999). Maternal, paternal, teacher and independent observer report of child behaviour was utilized. Independent ratings of child behaviour during creative, physical and structured play at school were recorded. Maternal recurrent depression was assessed at 5 years by the SADS. Other maternal report scales include the Life Events and Difficulties Schedule, and maternal report of child neurotic or antisocial behaviour at home. The correlations between maternal and paternal report of child behaviour at home were high (r =.70). Mothers with PPD reported significantly higher levels of child behavioral disturbance in the home (particularly neurotic and antisocial behaviour) than non-PPD mothers, even after controlling for attachment security, sex of child,

parental conflict, and socioeconomic status. At school, children of PPD mothers were significantly more likely to engage in physical (i.e., sand or water) than creative play when compared to control children. Murray suggests that physical play is often motivated by the desire for the pleasure of the physical experience itself, has little cohesion, and offers few opportunities for planning, elaboration, feedback or correction. Finally, PPD was not associated with interaction with the teacher.

Another study by Cicchetti et al. (1998) examined contextual risk as a mediator between PPD and child behaviour, and used paternal report to corroborate maternal report. One-hundred and fifty-six 21-month old toddlers and their mothers and fathers were recruited. One hundred and four mothers had a history of Major Depressive Disorder (MDD) since the child's birth (not necessarily postpartum). In bivariate analyses comparing children of depressed and non-depressed mothers, there were significant differences in total behaviour problems, and marginally significant group differences in internalizing problems, but none for externalizing behaviours. When taking into account contextual risk factors, the relationship between total number of behaviour problems and maternal depression disappears, but the marginal effect of maternal depression on internalizing child behaviour remains. However, because the study looked at depression 21 months postpartum, no specific relationship between PPD (versus maternal depression) and child behaviour can be drawn.

Research questions are now arising regarding the relationship between PPD and child conduct disorder (Smith, 2002; Murray et al., 1997b). Conduct disorder is defined in the Diagnostic and Statistical Manual of Mental Disorders as a repetitive and persistent pattern of behaviour in which the basic rights of others or major age-appropriate societal norms or rules are violated, as manifested by aggression to people and animals, destruction of property, deceitfulness or theft, or serious violation of rules. Glover, O'Connor, Heron, and Golding (2002:Marcé Meeting) examined hyperactivity / attention deficit disorder in a cohort of 7700 mothers, and showed boys of PPD mothers had increased behavioural problems of this nature at 4 years (OR=1.85). More methodological detail will be available upon publication of this study.

Sleep

There were two cross-sectional studies on childhood sleep problems. The first sleep study used a matched control group (Armstrong, O'Donnell, McCallum, & Dadds, 1998). PPD was assessed with the EPDS, children were on average 12 months old, and child sleep was assessed via maternal report. Forty-seven mothers presenting for child sleep problems, and 50 matched control mothers completed the paper-and-pencil battery, which also assessed maternal sleep and pregnancy-related variables. In bivariate analyses, children with sleep problems were significantly more likely to have a mother scoring higher than 12 on the EPDS than were children without sleep problems. The data limitations surrounding maternal report of sleep preclude any conclusions in this domain as PPD may affect maternal perceptions in a negative direction.

Hiscock and Wake surveyed 738 mothers of babies 6-12 months of age attending routine hearing testing sessions (Hiscock & Wake, 2001). The survey consisted of the EPDS, sociodemographic items, infant factors (e.g., sex, birth weight, breastfeeding status, use of childcare), and maternal perception of infant sleep (i.e., sleeping in the parent's bed, being nursed to sleep, taking longer to fall asleep, waking more often and for longer duration, and taking shorter naps). Maternal report of infant sleep problem was strongly associated with scores greater than 12 on the EPDS ($p<.001$), and EPDS scores increased with sleep problem severity. However, past history of maternal depression was also significantly related to EPDS scores. Therefore it is unclear from this study if there is indeed a relationship between PPD and infant sleep over and above maternal history of depression, nor can this study speak to direction of effect.

Crying and Motor Behaviour

A prospective study recruiting 88 expectant mothers in Montreal, assessed the relationship of postpartum mood to maternal report of infant crying, and activity level assessed by actometers (i.e., small wristwatches modified to detect motion) at 6 weeks (Miller, Barr, & Eaton, 1993). PPD was assessed by the General Health Questionnaire, not through RDC. After partialling out effects of maternal age, education, family SES, infant gender, and feeding method, mothers with depressive symptomatology postpartum had infants whose crying duration and frequency was reported as significantly greater than mothers without mood disturbances. However, postpartum mood did not effect the infant's activity level as measured by the actometers. Because PPD may affect maternal perception of infant crying, further study is required.

However the study reviewed above by Jones et al. (2001) measured crying objectively, and showed that when mothers have higher EPDS scores, infants have a shorter latency to cry and higher intensity of crying when faced with similar stimuli than infants of low-EPDS scorers. Thus, these studies would suggest that PPD may have an effect on crying but not motor behaviour.

Table 3-9. Summary of Key Child Behaviour Articles[1]

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Philipps et al., 1991) U. of Iowa Hospitals & Clinics, US	Prospective 4.5 year follow-up	70 women recruited by letters from a public ObGyn clinic and two private practices mainly Caucasian, married; 10 with PPD	Maternal: BDI, SAS, DAS Infant: CBCL (maternal report)	CBCL scores of children were close to the norm, regardless of previous maternal PPD. PPD was sig. related to subsequent maternal depression, but not child behavior problems. Concurrent depression was sig. related to child behavior problems at 4 and a half years	Small sample size Maternal report of child behavior
(Murray et al., 1999) Cambridge, England Feb. 1986 – Feb. 1988	Longitudinal: 5 year follow-up	Part of (Murray, 1992) recruitment 58 mothers with PPD 42 without PPD Representative community sample -Primiparous, married or cohabiting, 20-40 years old, full-term pregnancy	Maternal: SPI with RDC (2 months post-partum); SADS-L (18 months); LEDS Child: maternal report of child behavior; child behavior in school (time-sampled ratings at 5 years); 18 months: Ainsworth's Strange Situation, Bayley Scales of Mental Development Mother-child interaction rated with time-sampled videotape	Correlations between maternal and paternal report of child behavior =.70. Maternal reports of the child's behavior at home showed a sig. effect of PPD; in particular, child neurotic and antisocial behavior were high. At school, physical play was significantly related to PPD, Interaction with the teacher was not associated with PPD	Processes that mediate the link between postnatal depression and the child's free play in school are not entirely clear. -homogeneous low risk sample

[1] See Table 3-10 for abbreviations used within tables

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
(Cicchetti et al., 1998) United States Not specified (date of publication: 1998)	Matched comparison group	Participants were a subset of a larger longitudinal study on the effects of maternal depression on child development. 156 toddlers (M age=20.39 months, SD=2.62); 69 girls and 87 boys and their parents; 104 toddlers had mothers with MDD; 52 comparison children had parents with no history of psychiatric disorder.	Parental: DIS-III-R, BDI, Daily Hassles Scale of Parenting Events; ISEL; PSS; DAS; FES Child: Bayley MDI; AQS; CBCL	Bivariate analyses comparing children of depressed and non-depressed mothers: significant differences in total behavior problems, and marginally significant group differences in internalizing problems, but none for externalizing behaviors. Contextual risk factors: relationship between total number of behavior problems and maternal depression disappears, but the marginal effect of maternal depression on internalizing child behavior remains	Because the study looked at 21 months postpartum, a specific relationship between PPD and child behavior cannot be shown.
SLEEP					
(Armstrong et al., 1998) mother/baby hospital and 4 Community Child Health Centers in Brisbane, Australia	Cross-sectional community survey	47 mothers presenting for child sleep problems, and 50 matched control mothers Infants were on average 12 months old	Maternal: EPDS, self-report on social and demographic variables, emotional adjustment and sleep pattern during pregnancy Infant: sleep problems survey (maternal report)	Children with sleep problems were significantly more likely to have a mother scoring higher than 12 on the EPDS than were children without sleep problems	Subjective maternal report of infant sleep problems Small sample
(Hiscock et al., 2001) May 1998-April 1999 Maternal and Child Health Centers in suburban Melbourne, Australia	Cross-sectional community survey	Mothers attending routine hearing testing sessions were invited to participate 738 mothers (94% response rate); 46% reported infant sleep problems	Maternal: EPDS Infant: sleep problems survey (maternal report)	Maternal report of an infant sleep problem was a significant predictor of an EPDS score >12 (odds ratio: 2.13; 95% confidence interval: 1.27, 3.56) and >10 (odds ratio: 2.88; 95% confidence interval: 1.93, 4.31) However, mothers reporting good sleep quality, despite an infant sleep problem were not more likely to suffer depression	Subjective maternal report of infant sleep problems

Citation & Country	Study Design	Participants & Method of Recruitment	Measures	Results	Limitations
CRYING & MOTOR BEHAVIOUR					
(Miller et al., 1993)	Cross-sectional community survey	88 mother-infant dyads Expectant mothers recruited in the third trimester from obstetricians' offices and a pediatric practice that offered prenatal registration in Montreal	Maternal (33-36 week of pregnancy and 5 weeks postpartum): GHQ-30, STAI, Pitt Questionnaire, 1-week diary of infant behavior and maternal caretaking activity (postpartum only) Infant: 48-hour recording of motor activity with actometers (50 infant subsample only)	Mothers with depressive symptoms postpartum had infants whose crying duration and frequency was reported as significantly longer than mothers without mood disturbances. However, postpartum mood did not affect the infant's activity level as measured by the actometers.	PPD assessed by the GHQ, not through RDC PPD may affect maternal perception of infant crying

Summary

Although the meta-analysis reported a small effect size, the outcomes included cognitive factors (i.e., McCarthy Scales, Piaget's object concept tasks) so caution is warranted. The studies outlined above support a small-sized relationship between PPD and child behaviour up to five years. In particular, PPD may increase distractibility, antisocial or neurotic behaviour, and effect choice of play in children. Several studies provide some evidence of an effect of maternal concurrent depression. The use of maternal report of child behaviour is clearly biased. Contextual factors (e.g. parental conflict and low socioeconomic status) likely play a large role in child behaviour, as does the child's sex, with boys showing more effect in some studies. However, it is not related to prosocial behaviour, or interaction with a teacher.

With regard to crying, motor behaviour, and sleep, PPD has significant effects on latency and intensity of crying. Thus, these infants are quicker to cry in response to stimuli, and the crying is louder and longer. However, there are no significant effects on infant motor behaviour (assessed via actometer). There is insufficient evidence to determine the effect of PPD on infant sleep. More research is needed in this area. Physiological data from sleep laboratories would shed some light on these possible effects.

PPD in Subpopulations and Its Effect on Maternal-Infant Interaction and Child Growth and Development

Through the extensive literature search, articles relevant to mothers at special risk of PPD and vulnerable infants were notable, as were articles concerning the effect of PPD in different cultures and

countries. In particular, the literature addressed the following subpopulations: mothers with substance abuse histories, mothers with an abuse history or abuse potential, adolescent mothers, and mothers from diverse ethnoracial backgrounds.

Substance-Abusing Mothers

Mother-child interaction and child cognitive development was assessed prospectively in a sample of 78 heavy chronic cocaine users who retained custody of their infants (Beckwith, Howard, Espinosa, & Tyler, 1999). At six months postpartum quality of interaction was observed and assessed in the home, the Bayley scale of infant development was administered in the lab, and PPD was measured with the BDI. Many of the participants were poor, uneducated, unemployed, or minority status, with low birthweight infants. Twenty-nine percent of the mothers scored higher than 15 on the BDI, indicating severe depressive symptomatology. In hierarchical regression analyses, PPD did not significantly predict the mother-infant interaction, but paranoid symptoms during pregnancy did. Degree of stimulation, facilitation, quality of physical contact, intrusiveness, and delight did not differ based on presence or absence of BDI >15 at 6 months postpartum. Cognitive development was unaffected by PPD, but depressive and paranoid symptoms during pregnancy were at play. However, mothers who were depressed both pre and post-natally displayed the least positive interactions with their infant.

Adolescent Mothers

Forty-four adolescent mothers and children were followed longitudinally to assess behaviour problems and social competence at 13 and 54 months (Hubbs-Tait, Osofsky, Hann, & McDonald Culp, 1994). PPD was assessed with the CES-D, and outcome measures included the CBCL, and Ainsworth's Strange Situation. The mothers were on average 16.6 years old at the time of giving birth. The majority of the mothers were White (61.3%). Sixty-four percent of the participants lived with their own mothers, and only 11% lived with the child's father. When predicting both internalizing and externalizing behaviour problems on the CBCL, only maternal depressive symptomatology at 54 months was significant. When predicting scores on the social skills and friends subscales of the CBCL, postpartum depression was not significant again.

One-hundred and twenty inner-city African American and Puerto Rican adolescent mother-infant dyads were part of an ongoing study of the risk and protective factors affecting the development of young mothers and their children (Leadbeater, Bishop, & Raver, 1996; Raver & Leadbeater, 1995). Mothers were recruited 3 to 4 weeks after delivery, and re-interviewed at 6, 12, 20, 28, and 36 months postpartum. At delivery, the mothers were between 13 and 19 years of age (mean age 17). Most lived with their own mothers (71.7%) and came from families receiving public assistance (64.6%). PPD was assessed with the BDI, and maternal report of child behaviour was assessed with the CBCL. A 20-minute mother child free-play interaction was

videotaped at 20 months and coded for joint interaction, contingent responding, and mother-toddler conflict. Maternal depression in the first year postpartum was significantly correlated with maternal depression at 36 months, poor maternal-child contingent responding at 20 months, and child problem behaviours at 28 months, but not maternal-child conflict. Sixteen percent of the variance in child behaviour problems was explained by the combined effects of depressive symptomatology in the first year postpartum and maternal-toddler interaction; but the early depressive symptomatology only accounted for 3% of the additional variance. Depressive symptomatology at 36 months explained 13% of the variance in mother-toddler interaction however.

PPD in Different Countries / Cultures

A cross-sectional Japanese study examined self-reported PPD and maternal perceptions of attachment to infants in 417 mothers (Nagata et al., 2000). A survey administered 5 days postpartum included the Zung self-rating depression scale, and a postpartum maternal attachment scale with two factors, reflecting maternal attachment and anxiety regarding children. Path analysis demonstrated a relationship between depressive symptomatology and maternal perception of attachment.

A study conducted in a peri-urban settlement in South Africa also examined the relationship between PPD and the mother-infant relationship (Cooper et al., 1999). One hundred and forty-seven mothers were recruited at 2 months postpartum, interviewed, administered RDC, and filmed with their baby for a five-minute period. Results showed that maternal sensitivity in engagement with the infant was significantly poorer in depressed than non-depressed mothers, and likewise the infants were also less positively engaged in these interactions. No significant associations were found with maternal demographic characteristics, indices of socioeconomic adversity, level of emotional support, infant birth weight, and practical support from family and friends. However, the presence of the father in the home added significantly to the prediction of maternal sensitivity, over and above the contribution of depression.

Several other studies reviewed above sampled diverse ethnocultural groups (Jones et al., 2001; Leadbeater et al., 1996; Sugawara et al., 1999). However, much more work in this area is needed, considering contextual factors relating to specific groups is sorely lacking.

Summary

This review does not represent an exhaustive list of vulnerable subpopulations at risk of adverse PPD effect on mother-infant relationships and child growth and development, but this summarizes the state of the literature. Moreover, the effect of diverse maternal characteristics based on culture have not been given adequate research attention. Other potential vulnerable subpopulations are identified in the following section.

Implications and Directions for Future Research

Duration of Depression

Because it is common for postpartum depressive symptoms to persist beyond a year after childbirth, it is important that researchers consider the long-term effects that maternal depression may have on the infant, including growth and development. For instance, it is important to monitor the mother's mood over time to assess whether the depression will remit after the postpartum period or sustain. Data presented at the Marcé Society Meeting (Australia, 2002) suggests up to a 41% one-year recurrence or persistence of maternal depression as assessed by the Hamilton Rating Scale and RDC (Wisner et al., 2002).

A few of the studies reviewed above distinguished among the chronicity, duration, and severity of depressive symptomatology, but more work is required. Longitudinal analyses of the continuing effects of children's exposure to depression are important. Preliminary studies suggest that it is chronic or recurrent maternal depression that affects the infant's development, not necessarily postpartum-specific depression (Murray & Stein, 1991). Themes such as how the child copes with long-term exposure to maternal depression, how child growth and development is hindered by long-term exposure to maternal depression and the potential likelihood of the child developing depressive symptoms in later childhood or adolescence are important next steps in the field. In addition, monitoring of children's social behavior, including interpersonal relationships, is imperative.

Lynne Murray's cohort is now 13 years of age, allowing for assessment of adolescent psychiatric disorder. Research presented at the most recent Marcé Society meeting concur that it is recent exposure to depression that has the greatest effect on children (Murray, 2002). Although it is difficult to measure depressive symptomatology in children, anxiety and depression does appear to be increased in adolescent children of PPD mothers versus non-PPD mothers. This could be accounted for by genetic predisposition however. Moreover, teens generally have conflict with parents, and thus the direction of this relationship must be scrutinized.

There is also the question of sensitive periods of development. Some research suggests that if a child between the ages of 5 and 8 is exposed to a depressed mother problem-solving abilities may be affected. In a novel card playing tasks, children of PPD mothers were more likely to make internal, global and stable attributions (e.g., 'I always lose') of failure when they repeatedly lost a rigged card game, versus children of non-PPD mothers who made external, specific and unstable attributions (e.g., 'This is not my lucky day today') of their losses (Marcé Society Meeting, 2002 (Murray, 2002)). Only longitudinal data can allow us to ask these questions.

Measurement Issues

Researchers generally assess the effects of PPD on mother-infant relationships by monitoring interactions on video. There are numerous coding schemes created to quantify infant temperament and behaviour that are not consistent across studies. In fact, there are as many coding schemes as there are studies. Some uniformity and psychometric validation of these observational techniques are required to enable meaningful meta-analyses and comparison across samples.

Moreover, reliance on maternal report is confounded due to negative cognitive distortions inherent in depressive symptomatology. By assessing child behaviour for example via paper-and-pencil measures, observations by PPD mothers versus non-PPD mothers may differ owing to PPD, not child behaviour differences per se. Studies with blinded observation by trained raters are few. The over-reliance on maternal reports could also be overcome by utilizing psychophysiological measures. For example, since sleep disorders are frequently used as an indicator of infant behaviour, a controlled sleep study in which infants are monitored overnight in a sleep laboratory may be a useful alternative to reliance on parent (and particularly maternal) report.

Some studies have used paternal reports of child behaviour, to avoid the pitfall of maternal report which may be cognitively distorted due to PPD. In one such study, paternal reports of child behaviour corroborated maternal reports (Cicchetti, Rogosch, & Toth, 1998). In another study, paternal reports on the Child Behaviour Checklist indicated greater behavioural problems in families with a PPD mother than a non-PPD mother (Sharp et al., 1995). Paternal perception on mother-infant relations and child development may serve as a meaningful adjunct to observations of trained clinicians.

Bi-Directional Influences: Effects of Infant Behaviour

It has been documented that personality begins to emerge at birth, thus indicating that infants contribute their own personalities (and genetics) to the mother-infant relationship (Mayberry & Affonso, 1993). Because this relationship is dyadic, it cannot be analyzed in a linear fashion. Paying particularly close attention to infant factors can be helpful in assessing maternal depression, as well as in better understanding the dyadic relationship of the mother and the infant (Kendall-Tackett, 1993). Direct assessments of 'difficult' infants are not always conducted in the neonatal period to resolve the issue of whether the infant is in fact inherently temperamentally irregular or 'difficult' or whether the infant temperament is actually in response to being around a depressed mother (Murray et al., 1991).

Another study by Murray et al. (1996) examined the role of infant factors in postnatal depression and mother-infant interactions. Using self-reported and clinician-administered diagnostic criteria to assess postnatal depression in a sample of over 200 mothers, they assessed maternal perception of infant behaviour, blind researcher perception of infant behaviour, and videotaped face-to-face interaction of mother-infant

interactions. Through multivariate analyses which controlled for potential confounding factors such as gestational age, birthweight, perceptions of the infant, smoking, labour factors, motor behaviour and irritability of infants each had an independent effect on the likelihood of maternal depression. Poor motor scores and high levels of infant irritability in the neonatal period also predicted less optimal infant behaviour in face-to-face interactions with the mother at two months postpartum. However, infant behaviour did not predict the quality of maternal behaviour in such interactions.

Fathers, Grandmothers and PPD

One of the predictors of postpartum depression is marital disharmony. More research needs to examine the father's role in postpartum depression (Breiding-Buss, 2001; Welford, 1996). Questions abound surrounding whether a father could act as a buffer between mother and child, or alternatively could be a detriment through abuse, or through behaviours such as rigidity, unrealistic expectations, jealousy, and lack of tangible assistance. It is speculated that depressive symptomatology may appear when social support from relatives and friends is withdrawn, and mothers are left with full responsibility for the child.

Triadic father-mother-infant interaction has been scantly investigated in the context of postpartum depression. A study by Chabrol et al. (1996) videotaped interactions of PPD mother-infant, father-infant, and mother-father-infant family units versus interactions in units with non-PPD mothers. Although the index ("PPD") mothers in this study did not score particularly high on the EPDS, the relationships did not differ between infant and father or infant and mother for the PPD versus non-PPD units. The small sample size of 40 units, poor operationalization of PPD, and cross-sectional nature of this study clearly indicate the need for further work in the area.

A study to examine the issues of fatherhood should be undertaken. For example, by comparing families in Canada where parental leaves are now lengthened, versus Nordic countries where parental leaves are similar but more fathers participate, we could better understand some dynamics at play. How do PPD rates compare where fathers take paternal leave? What are the effects on child growth and development?

Additionally, though the majority of postpartum research examines the mother who is the primary caregiver, diverse research samples should include multiple caregivers, especially those assisting a postpartum parent. One study on black adolescent mothers made reference to grandmothers assisting in childrearing (Leadbeater et al., 1996), but neglected to empirically document the effect of this relationship. Time with alternative caregivers (or in daycare) may provide babies of PPD mothers with emotionally corrective experiences.

Mothers' Parity, Birth Order and Children's Development

Why do some women suffer greater postpartum depression with one birth versus another? Could this be due to the infant factors contributing to the interaction? By using a systems approach to the issue of PPD,

future studies may wish to examine the social climate of families over a period of time to see what factors may affect mother-child interactions and cause maternal depression to recur or linger. Co-occurring risks must be discussed in analyses of postpartum women as some researchers indicate that social status indicators and parity are more important predictors or mother-infant interaction, infant functioning and child outcome than maternal diagnosis.

Sex of Infant, and PPD Effects on Development

Numerous studies reviewed suggest boys are at greater risk of poor development than girls when faced with maternal PPD. For instance, a study by Cohn et al. (1990) shows an interaction between infant sex and PPD whereby mother-infant interactions of PPD mothers with boys, although not girls, were less positive in nature. Murray et al. (1993) showed that maternal speech patterns had more negative effect on infant boys than girls. Independent of concurrent maternal depression, the odds of an insecure attachment are 3.6 times greater for boys than for girls when the mother had PPD (Murray, 1992). Teacher assessments of child behaviour at 5 years also showed sex effects in this cohort (Sinclair et al., 1998). Sharpe et al. (1995) demonstrated prospectively an effect of PPD in the first year with lower scores in boys, but not girls, on standardized cognitive tests. A 7-year longitudinal study (Kurstjens et al., 2001) shows a three-way interaction effect on cognitive outcome of PPD by infant sex and SES. Thus, the literature on links between PPD and children's cognitive development indicates that girls and boys are affected in different ways. Confirmation of a gender difference awaits analysis of data in a larger, representative sample.

What are some possible explanations for this gender effect that need to be tested empirically? One possibility is that the maturational advantage held by infant girls in the population as a whole might protect them from the impoverishment or disorganization of social experience associated with the mother's depression. Thus perhaps boy's abilities to regulate their attention and emotion are particularly in need of facilitation from a sensitive and emotionally-healthy caregiver (Murray et al., 1997b). Additionally, it is possible that depressed mothers treat their sons and daughters differentially, or that the child's gender has an impact on the duration of the mother's depressed mood. Moreover, considering that boys are more likely to develop insecure attachments than girls, this may impede social competence and foster behavioural problems.

Implications for Policy and Practice

These findings have implications for policy makers, program managers, service delivery personnel, and the public. They can be used to guide the development of practice and policy recommendations that are client-focused and evidence-based. As outlined in Chapter 1, postpartum depression occurs in approximately 10-15% of mothers and may cause negative effects on the mother-infant relationship and child growth and development. These effects are more likely due to recurrent chronic depression in approximately 25% of mothers who have experienced PPD. Therefore, early identification and treatment of depression in women

across the lifespan through evidence-based therapies may minimize the effect on children. Further research is warranted.

Conclusions

The literature identifies several factors contributing to poor mother-infant relationships, which may be related to both maternal and child factors. In regard to the former, mothers with PPD may have more difficulty engaging their infants in interaction and in continuing to develop this interactive dialogue (Miller, 1999). Moreover, if the mother's disorder persists, a maternal interactional pattern of disinterest, neglect or negativity can become mutual so that the infant becomes disinterested, neglecting or negative to the mother. In regard to the latter, an infant characterized as difficult (i.e., negative, cries frequently, maladaptive, 'colicky', poor sleeping habits, slow to accept new people or routines, difficult to regulate eating patterns) may be related to maternal PPD. Overall, it appears that PPD has early variable effects on mother-infant relations, but measurement issues preclude comment on longer-term effects.

With regard to child growth and development, the strongest effects of PPD appear to be on cognitive development such as language, intelligence (IQ), and Piaget's object concept tasks. But these effects are mixed, and relate to contextual factors and child sex. The increased risk of sudden infant death in the study by Sanderson et al. was intriguing. The physical development literature requires future research to resolve conflicting findings. The two methodologically rigorous studies incite questions about the duration of PPD prior to showing effects on child height or weight, and differential effects in developed versus underdeveloped countries. With regard to emotional development, PPD appears to have early effects up to 10 months postpartum, but research refutes longer-term effects. Similarly with the attachment literature, PPD appears to play a role in insecure attachment up to 18 months, but thereafter the literature is inconclusive. The literature on child behaviour generally supports an effect of PPD on distractibility, antisocial and neurotic behaviour in the home and at school up to 5 years postpartum. However, teacher reports of child behaviour are not supportive of effects of PPD, and over-reliance on maternal report of child behaviour warrants caution.

In conclusion, research suggests that postpartum depression may affect the mother-infant relationship and child growth and development. However, it is likely chronic or recurrent maternal depression that is related to later effects on the child, rather than postpartum depression per se. The adverse effects of PPD on mother-infant relationships and child growth and development seem to be mediated through maternal interpersonal behaviour and sex of infant. The impact is likely to be worse where the depressive episode is severe and prolonged, and where it occurs in the context of adversity. Moreover, possible sensitive periods where effects on infants or children may be more pronounced are made in the literature, although data are equivocal (Larsen & O'Hara, 2002; Murray & Cooper, 1997a). As Sir Michael Rutter states in his thoughtful

afterword in Murray and Cooper's book (Murray et al., 1997b), the only fair conclusion is that PPD is a risk indicator, not a risk mechanism for impaired infant development.

Table 3-10. List of Table Abbreviations

ABBREVIATION	MEANING
AS	Achievement score
ASQ	Adjustment to School Questionnaire
AQS	Attachment Q-set
BDI	Beck Depression Inventory
CES-D	Center for Epidemiologic Studies-Depression Scale
CBCL	Child Behavior Checklist
CMM	Columbia Mental Maturity Scales
DAS	Dyadic Adjustment Scale
DASII	Developmental Assessment Scale for Indian Infants (based on the Bayley Scales of Infant Development)
DIS-III-R	Diagnostic Interview Schedule III-R
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders
EAS	Emotional Availability Scales
EEG	electroencephalograph
EPDS	Edinburgh Postnatal Depression Scale
FES	Family Environment Scale
GCI	General Cognitive Index
GHQ	General Health Questionnaire
GRIMS	Golombok-Rust Inventory of Marital State
ISEL	Interpersonal Support Evaluation List
ITSEA	Infant-Toddler Social and Emotional Assessment
K-ABC	Kaufman Assessment Battery for Children
LEDS	Life Events and Difficulties Schedule
MADRS	Montgomery and Asberg Depression Rating Scale
MDD	Major Depressive Disorder
MDI	Mental Development Index
MPC	Mental Processing Composite
NFTT	non-organic failure to thrive
ObGyn	Obstetrics and Gynecology
PPD	postpartum depression
PBCL	Preschool Behavior Checklist
PBQ	Prosocial Behavior Questionnaire
PCERA	Parent-Child Early Relational Assessment Scale
PSE	Present State Examination
PSS	Perceived Stress Scale
RDC	Research Diagnostic Criteria
RITQ	Revised Infant Temperament Questionnaire
SADS-L	Schedule for Affective Disorders and Schizophrenia
SAS-SR	Social Adjustment Scale—Self-Report
SCID-NP	Structured Clinical Interview for the DSM-III-R-Non-Patient Version
SIDS	Sudden Infant Death Syndrome
SDS	Zung Self-Rating Depression Scale
SES	socioeconomic status
SPI	Standardized Psychiatric Interview
STAI	State-Trait Anxiety Inventory
TABC	Temperament Assessment Battery for Children
TTS	Toddler Temperament Scale
WAIS-R	Weschler Adult Intelligence Scale- Revised

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CHAPTER 4: PUBLIC HEALTH INTERVENTIONS AND STRATEGIES WHICH REDUCE OR MITIGATE THE IMPACT OF POSTPARTUM DEPRESSION ON THE MOTHER-INFANT RELATIONSHIP AND THE GROWTH AND DEVELOPMENT OF CHILDREN

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Citation:

This chapter should be cited as:
Wallington, T. (2003). Public health interventions and strategies which reduce or mitigate the impact of postpartum depression on the mother-infant relationship and the growth and development of children. In Stewart, D.E., Robertson, E., Dennis, C.-L., Grace, S.L., & Wallington, T. (2003). Postpartum depression: Literature review of risk factors and interventions

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Ontario Early Years

Financial assistance by Health Canada

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Table of Contents

CHAPTER SUMMARY

Introduction/Background

The first years of an infant's life represent a critical period of development. Evidence has emerged to suggest that the quality of early childhood care has a profound impact on the developing infant, and has long-term implications for the child's ongoing development and psychological health. There is evidence that has enriched the scientific debate by implicating postpartum depression in a range of adverse child cognitive and emotional outcomes (Murray & Cooper, 1997b). The purpose of this chapter is to review the best available evidence supporting the implementation of public health interventions which can reduce or mitigate the impact of postpartum depression on the maternal-infant relationship and infant growth and development.

Methods

Databases relating to the medical, psychological and social science literature were searched using specific inclusion criteria and search terms, to identify studies which examine the impact of various interventions on preventing and/or mitigating the impact of postpartum depression on the mother-infant relationship and infant outcomes. Studies were identified and critically appraised in order to synthesize the current findings. The criteria used to evaluate the interventions outlined in this chapter were based on the standardized methodology developed by the Canadian Task Force on Preventive Healthcare.

Results

The search revealed limited research. Ten relevant papers were identified with interventions in home visitation, telephone counselling, interactive coaching, group interventions, or massage therapy.

Key Findings

The interventions that were evaluated provide varying degrees of promise in terms of their potential impact on preventing and/or mitigating the impact of postpartum depression on the maternal-infant relationship and infant cognitive, behavioral, and developmental outcomes. The recommendations that have been provided in this chapter are I (insufficient evidence) level grades. It is important to emphasize that this area of study is in the early stages of evolution, and requires further research. None of the discussed strategies which include home visits, telephone interventions, interactive coaching, group therapy, or massage therapy can be recommended as standards of care. These recommendations should not be extrapolated to other program areas and can only be interpreted within the context of postpartum depression and its impact on the maternal-infant relationship and infant outcomes.

LIST OF TABLES

Introduction

The first years of an infant's life represent a critical period of development. Evidence has emerged to suggest that the quality of early childhood care has a profound impact on the developing infant, and has long-term implications for the child's ongoing development and psychological health. The first months and years of an infant's life would therefore, appear to be an ideal time to implement interventions which can prevent the myriad of known developmental abnormalities associated with early negative sensory experiences and stress (Armstrong et al., 2000).

Although it cannot be disputed that there are fundamental conditions and prerequisites for health that interact to shape the developmental path of an infant, there is increasing evidence that implicates postpartum depression in a range of adverse child cognitive and emotional outcomes (Murray et al., 1997b; Newport et al., 2002; Caplan et al., 1989).

It has become clear that the quality of the early maternal-child attachment is a major predictor of long-term outcome. (Jacobsen, 1999; Hiscock & Wake, 2001; McMahon, Barnett, Kowalenko, Tennant, & Don, 2001; Sinclair & Murray, 1998; Stein et al., 1991; Wisner, Parry, & Piontek, 2002; Field, 1998; Field, Fox, Pickens, Nawrocki, & Soutullo, 1995).

The adverse impact of postpartum depression upon the maternal-infant relationship and child development makes the need for early identification and effective treatment models essential. Unfortunately, there is a paucity of studies on the treatment of postpartum depression in which child measures are obtained. This is significant given the evidence implicating postpartum depression in parenting impairments, infant behavioral problems, delayed cognitive development, and insecure attachment (Cooper & Murray, 1997). This issue is of both clinical and theoretical importance, and the debate around what constitutes an appropriate clinical response to prevention and treatment of postpartum depression and adverse infant outcomes is far from resolution.

Methods and Criteria for Critical Appraisal and Ranking of the Evidence

As very few studies have been conducted looking at public health interventions for the prevention of adverse effects of postpartum depression on the mother-infant relationship and child growth and development, the initial overall search terms used were very broad in order to prevent overlooking an important study for this chapter (See Appendix A). The databases searched are listed in Appendix B.

The tables of contents of key journals were reviewed for relevant articles that were published in the last two years. In total 42 journals were searched in this manner. (See Appendix C). Abstracts of studies presented at the most recent Marce meeting in Australia were reviewed. The bibliography of each of the retrieved articles used in this review was also scanned, and researchers in the field of postpartum depression who are based in North America, Europe, and Australia were contacted. These researchers were asked to

provide additional information on studies that were in review at the time of the writing of this chapter, as such studies were likely to provide a significant contribution to the content of this chapter. Finally, key individuals in promising and relevant programs that are specifically focused on the subject reviewed in this chapter were also contacted.

The inclusion and exclusion criteria were also fairly broad. In the initial search, studies were included if they were written in English, published from 1990 onwards, and peer reviewed. If they did not meet the above criteria they were excluded from the initial review process. Studies that were based on pharmacological interventions were not within the scope of this chapter.

In the initial search, approximately 1500 abstracts were reviewed. These abstracts represented a mix of review articles and primary studies. Of the abstracts initially reviewed, approximately 120 articles representing a mix of review articles and primary studies were retrieved for further assessment. Nine primary studies met the inclusion and exclusion criteria. See the overall methods section for a discussion of the criteria.

Criteria for Critical Appraisal and Ranking of the Evidence

As discussed in the overall methodological framework, the criteria used to evaluate the various interventions outlined in this chapter were based on the standardized methodology developed by the Canadian Task Force on Preventive Healthcare (Canadian Task Force on Preventive Health Care, 2003). In addition to the task force criteria, other factors were considered in the appraisal of the interventions. These factors included issues such as where the study was conducted and whether or not the results of a study conducted in a setting outside of Canada would be generalizable to the Canadian population. Were the interventions safe and were they acceptable to health care providers and patients? How costly were the interventions in terms of human resources, patient's time, and monetary cost to the system? How compliant were patients with the interventions? Would the interventions and the expected outcomes be acceptable to policy and decision-makers in terms of resource allocations and subsequent impact on public opinion?

There are several studies which have focused on interventions directed at preventing or mitigating the impacts of postpartum depression on women, but few have been conducted with infant and maternal-infant impacts as their outcome measures. Published interventions, in general, are not of high quality methodologically. As a consequence, the factors that guided the grading and recommendations in this chapter included not only quality of study design, but also key issues such as provider, patient, and policymaker acceptability.

Categories of Interventions in Postpartum Depression

In order to effectively synthesize the evidence and provide recommendations for given interventions, the discussion of the literature has been divided into five sections. Interventions directed at preventing and/or

mitigating the impact of postpartum depression on the maternal-infant relationship and infant development, will be discussed in the following categories:

1. Home visitation
2. Telephone counseling
3. Interactive coaching
4. Group interventions
5. Massage therapy

At the end of each section a final summary is offered on the overall quality of the evidence for the intervention, and a grade is assigned to each intervention.

Home Visitation

Four studies will be reviewed in this section. Included in this analysis is one randomized controlled trial published as two separate papers reporting results at different time points, one longitudinal prospective study with random allocation of participants, one non-randomized controlled trial, and one comparative study.

Randomized Controlled Trials

Armstrong et al. (1999) and (2000), conducted a RCT to determine the effectiveness of a nurse home-based intervention for vulnerable families with newborns. A small percentage of the women who entered this study were considered vulnerable as they met the criteria for PPD based on initial EPDS scores of >12. Women were recruited on the basis of self-reported risk factors. The hypothesis was vague, proposing that the home visits would have significant benefits for maternal and child health.

There was no significant difference between groups in EPDS scores at baseline, but by 6 weeks there was a significant difference between the two groups (p=0.003). Results for the Parenting Stress Index (PSI), a scale used to measure the degree of stress involved in the role of parenting, and the home observation for measurement of the environment (Home inventory score), a standardized measure to assess the quality of the home environment from a child's perspective were also significant.

In summary, nurse home visits had a positive and significant impact on maternal mood, parent satisfaction, and the quality of the maternal-infant dyad. See Table 4-1. The results must be interpreted with caution as the follow-up data is only reported to 6 weeks postpartum. Moreover, the intervention group had more primiparous women which suggest that these results cannot be extrapolated to the multiparous population. It also would have been interesting if the investigators looked at whether the women who had a distinct improvement in mood were also the same women who fared better on the PSI and HOME inventories. As it stands, the reader can only speculate about the relationship between mood and maternal-infant relationship.

This study provides some evidence for the use of nursing home visits to improve maternal mood and the maternal-infant relationship in the context of postpartum depression. Unfortunately, it does not address infant outcomes other than to speculate that the aforementioned benefits will bode well for the infant's long-term health and development. As well, it only addresses postpartum depression as one of many risk factors which contribute to the vulnerability of the mother and infant. The results are general and preliminary.

Armstrong et al. (2000), published a second paper reporting results from their 1999 trial at 4 months follow-up. See Table 4-1.

Table 4-1. Nurse Home Visiting to Vulnerable Families with Newborns

Author, Year, Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Armstrong 1999 Australia	RCT	181 I=90 C=91	High risk factors including PPD identified	Nursing Visits -weekly x6wks -every 2 wks to 3 months -monthly to 6 months	-EPDS -HOME -PSI Measured at baseline and 6 weeks	*At 6 weeks* EPDS I=5.8% C=20.7% P=0.003 HOME score I=28.34 C=25.51 P<0.001 PSI score f=8.72, p<0.05	Only small percentage of sample had PPD limiting the power to detect impact Follow-up limited in time Conducted outside N.A.	I Fair
Armstrong 2000						*At 4 months* EPDS I=5.75 C=6.64 P=0.32 HOME f 6.90, p<0.05 PSI - NS		

At 4 months, there were no significant differences between the two groups regarding maternal attachment, social isolation, relationship with spouse, and parental health. There was however, a statistically significant difference on the HOME scores. The initial positive impact of the intervention on maternal mood and the PSI index was clearly not sustained when reassessed at 4 months post intervention.

These results must be taken with caution as only a small percentage of women at the beginning of the study met the EPDS cutoff for PPD. The results may be due to a lack of power to demonstrate a statistically significant difference rather than a lack of impact in the home intervention. As well, it is not clear whether or not the first analysis at 6 weeks was done before the study was complete or after completion.

Prospective Longitudinal Trial

The findings of the Cambridge Treatment Trial, conducted by Murray and Cooper, and funded by the British Government Department of Health, are expected to be published in a peer-reviewed journal this year. The results presented are taken from the investigators' book chapter on postpartum depression and infant development (Cooper & Murray, 1997).

This trial was designed to address the following questions:

Would treatment of postpartum depression directed only at elevating maternal mood, indirectly improve the quality of the maternal-infant relationship and infant development?

Would a treatment directed specifically at the quality of the maternal-infant relationship work to elevate maternal mood, improve the quality of the relationship, and enhance infant development?

Finally, would a treatment that explored with the mother the quality of her relationship with her infant work as an effective antidepressant, improve the quality of the mother-infant relationship, and enhance child development?

This longitudinal study screened a large consecutive number of primiparous women for mood disturbance in the early postpartum period. In total, 207 women fulfilled the DSM-III-R criteria for current major depressive disorder, and 171 women completed treatment. Women were randomly assigned to one of three interventions and a control group.

1. Routine primary care (control group)
2. Nondirective counseling
3. Cognitive-behavioral therapy (CBT)
4. Dynamic psychotherapy

The investigators designed the three active interventions in such a way that if one or all of them proved to be effective they could be effectively delivered within the British National Health Service.

Assessors blind to the group assignments made all assessments. There was no difference in the mean EPDS scores between the 4 groups at inception. All 3 treatment groups experienced an improvement in mood after treatment, but by 9 months postpartum there was no difference in terms of improvement in mood between all 4 groups. No significant impact was noted on maternal-infant interactions.

Table 4-2. Cambridge Treatment Trial

Author, Year, Country,	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Murray and Cooper 1997 UK	Prospective longitudinal study, with participants randomly assigned to 1 of 3 interventions or a control group	194 women 52 -primary care 49- counseling 42 – CBT 48- dynamic psychotherapy	Primiparous women with PPD (DSM III-R)	1.Routine primary care 2. Nondirective counseling 3. Cognitive-behavioral therapy 4. Dynamic psychotherapy Interventions were delivered by 6 study therapists – this included a specialist in each of the 3 treatments and 3 generalists, including 2 NHS health visitors (nurses)	EPDS Maternal-infant interactions assessed through videotapes and infant behavioral development Both assessed before treatment, immediately after treatment, and at 9 & 18 months postpartum Infant cognitive development through Piaget stage IV & V assessed at 9 & 18 months postpartum	All 3 interventions improved maternal mood after treatment however, at 9 months no difference between 2 groups No impact on maternal-infant relations No impact on infant cognitive development Mothers in intervention groups reported fewer infant behavioral problems than mothers in the control group	Primiparous women only which make the results difficult to generalize Conducted in the UK which has a well established infrastructure for home visiting	I Fair

In summary, all 3 treatments were able to speed up the rate of remission from postpartum depression, but by 9 months postpartum there was no difference between the groups. None of the treatment groups improved face-to-face engagement, the rate of maternal reports of relationship problems was reduced equally by all 3 treatment groups, and no treatment had an impact on cognitive development. There was no association noted between cognitive impairment and postpartum depression in this sample. Finally, although there was no significant impact of treatment on infant attachment status, early remission from postpartum depression was associated with a reduced rate of insecure attachments.

These results are interesting but preliminary. The authors do not report on methods, including the randomization process, statistical analysis, and do not provide important pieces of information such as p values. This lack of information makes it difficult to judge the rigor of the methods and the validity of the results.

Non-Randomized Controlled Study

Cooper et al. (2002) conducted a controlled study assessing the impact of a mother-infant intervention in a small settlement located on the outskirts of Cape Town where 1 in 3 women experience early postpartum depression. The purpose was to train community workers to deliver an intervention to mothers and infants that would provide women with emotional support, and encourage them to be responsive and sensitive with their infants.

The intervention was delivered by 4 community workers who had very limited education with no specialist designations, but were trained in basic counseling skills.

The outcome at 6 months was compared to a control group drawn from mothers who were less educated and younger in an adjacent community.

The intervention had no impact on maternal mood, but these mothers demonstrated greater sensitivity in the videotaped feeding and playing sessions. The infants in the intervention group were significantly heavier and taller, despite no difference between the 2 groups in breastfeeding status.

The results of this small, non-randomized, poorly controlled study must be taken with caution as methods and statistical methods are unspecified. The results can only be considered as very preliminary and larger RCTs with long-term follow-up are required to confirm these tentative findings.

Table 4-3. Impact of a Mother-Infant Intervention in an Indigent Peri-Urban South African Context

Author Year Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Cooper, Landman, Tomlinson, Molteno, Swartz, Murray, 2002 South Africa	Non-randomized, prospective, pilot study	64 women I=32 C=32	Women living in settlement of Khayelitsha	4 community workers visited the mothers twice antenatally, – 2xwk for 4 wks – weekly for 8 wks – every 2 wks x 1 month – monthly x 2 months	Outcomes at 6 months DSM-IV Anthropometric measures of infant Video recordings of mothers and infants at play and feeding	No impact on maternal mood, p=0.16 Infants in intervention group heavier (p=0.01) and taller (p=0.02) Mothers in intervention group showed greater sensitivity in video (p=0.01)	Not randomized Not well-controlled Important demographic differences between 2 groups Conducted in South Africa	II-1 Fair

Table 4-4. The Outcome for Mothers and Babies of Health Visitor Intervention

Author, Year, Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Seeley, Murray, Cooper 1996 UK	Comparative study	80 women I=40 C=40	Women who delivered at a hospital in Cambridge who were dx with PPD	Home visiting by trained health visitors (RN's)	EPDS Mother's experience of infant care including perception of infant behavior and relationship with infant questionnaire (self-reported) Measured at 6 weeks and again 8-10 weeks later	Intervention group had improved EPDS scores p<0.001 No difference between groups for infant behavior (improved in both groups) Intervention group reported improved mother-infant relationship p<0.001	Comparative study between unmatched groups of women Non-standardized questionnaire for perception of infant behavior and relationship Conducted in UK	II-1 Poor

Comparative Study

Seeley, Murray, and Cooper (1996) conducted a comparative study between 2 unmatched groups of women with PPD to assess the impact of an intervention delivered by health visitors (nurses) on maternal mood, infant behavior, and mother-infant relationships. They screened a consecutive series of women who delivered at a local maternity hospital in Cambridge at 6 weeks postpartum using the EPDS.

There was a significant impact of the intervention on maternal depression and mother-infant relationship; however, the limitations of the study design need to be considered when interpreting the results.

It is not clear how the investigators selected this sample of women. There is no methods section and the authors did not document their statistical methods, so it is impossible to determine their appropriateness. They do not provide a reasonable definition of the intervention that is being provided, nor do they provide a description of the training process for health visitors.

Summary and Recommendations

The evidence for home visiting of mothers with postpartum depression in order to improve the maternal-infant relationship, and child growth and development is still evolving. Unfortunately, all of these studies had design and reporting problems that ranged from minor, to serious and unacceptable flaws. In summary, there were issues of small sample size or no sample size being reported at all, lack of uniform intervention delivery and poor description of the intervention in terms of the training of the health visitors and the interventions delivered in the actual home visit. Infant outcomes were either not measured at all or when they were measured the follow-up was not long enough to be considered meaningful. Methods were often not reported, basic demographic characteristics were usually not given, statistical methods were not always discussed, and conclusions were often speculative. This is particularly true for the infant outcomes. Many authors speculated that an improvement in maternal responsiveness to the infant would lead to improved infant cognitive, emotional, and behavioral development. This is a topic for future research, as these studies did not specifically measure infant outcomes.

It is also important to emphasize that none of these studies were conducted in a Canadian context. This is significant and must be considered when interpreting the results, particularly with respect to the British studies. There is a well-established system of health visitors (trained nurses) for all postpartum women in the UK. The additional training around identification of postpartum depression and even offering an intervention within the context of an established program is much more manageable when the infrastructure for a widespread program is already in place. These interventions would not necessarily be transferable to the current Canadian environment.

Some of these studies, especially the Cambridge Study, reported on fairly large-scale programs of home interventions without commenting on the resources it took to deliver the program. The scale of the

intervention suggests that a substantial amount of resources may have been used to deliver the program. The opportunity costs of offering a home visitation program on a scale such as the Cambridge Study are great, and could require a diversion of resources from other programs.

Overall, the studies reviewed seemed to be acceptable to both patients and providers. It is still too soon to determine whether or not home visits for postpartum depression are clinically significant and lead to beneficial long-term outcomes such as improved infant and child development. No researcher has explored this question, perhaps due to the difficulties involved in conducting a large prospective, longitudinal study.

Recommendation

There is a paucity of studies, which explore home visiting interventions that can either prevent or mitigate the impact of postpartum depression on the maternal-infant relationship and on infant and child developmental outcomes. Thus, at this point in time there is insufficient evidence to support the recommendation that the intervention be considered by public health as a preventative strategy to mitigate the impact of postpartum depression on the mother-infant dyad and infant development. More research is needed in this promising area of study (I Recommendation [I, II-1]).

Telephone Interventions

Thome and Adler (1999), conducted a randomized controlled trial to assess the benefit of offering a telephone intervention using CBT to postpartum mothers in the community who reported infant difficulty, and who met the criteria for postpartum depression and/or parental stress. The purpose of the study was to test the effectiveness of the intervention on relieving maternal distress and fatigue. They hypothesized that fatigue correlates with anxiety and depressive symptoms which fuel each other in a vicious cycle. If the fatigue can be ameliorated, it may have a positive impact on the depressive symptoms and ultimately the mother-infant relationship.

The outcome measures in this study included the PSI, EPDS, a new scale to measure fatigue and symptom distress designed by the investigators, and measures of infant difficulty.

The authors reported a decrease in symptoms of fatigue and distress in the intervention group, but maternal sleep expectations of the infant were not significantly different, and there was no difference between the two groups in maternal perception of a difficult infant.

The results of this study must be taken with caution for several reasons. The intervention is not well described. There is no discussion of prior training for the individuals who delivered the intervention. It is not clear what type of follow-up, if any the control group received. This study, as it is written, could not be replicated by another investigator.

Table 4-5. A Telephone Intervention to Reduce Fatigue and Symptom Distress in Mothers with Difficult Infants in the Community

Author Year Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Thome, Adler 1999 Iceland	Randomized Controlled Trial	70 mothers I=34 C=34	Distressed mothers defined as mothers who reported infant difficulty, and who had 1 or both of: PSI>75 EPDS>12	Telephone intervention based on CBT Nurses delivered intervention over 2 months maximum of 5 calls	Fatigue Symptom distress Maternal expectation of sleep behavior (MEX) Measure of infant difficulty PSI	Fatigue (p=0.001) and Symptoms of Distress (p=0.001) decreased in intervention mothers. Maternal sleep expectations of infants N.S. (p=0.05) Maternal perception of difficult infant N.S. (p=0.77)	Intervention not well described Not all scales standardized Follow-up period short Small sample	I Poor

The investigators also report results based on 2 scales that they created for this study which measure fatigue and infant difficulty. Psychometric properties of these scales are not reported, making it difficult to interpret the significance of the results.

Recommendation

There is currently not enough evidence to consider a telephone-based intervention as a valuable preventive strategy in reducing the impact of postpartum depression on the maternal-infant relationship, and on infant and child development (I Recommendation [I]).

Interactive Coaching

Horowitz, et al. (2001) examined the efficacy of interactive coaching in promoting responsiveness between mothers with depressive symptoms and their infants. The premise behind this intervention is that when a mother is depressed, sensitivity to her infant's cues is diminished, and the infant does not receive feedback in response to behavior. The mother's depressed affect and interaction style serve as a model for the developing infant's behavior style. If the interaction style can be modified to one which is more positive and emotionally responsive to the infant, protective mechanisms can be set in place for the developing child.

Women were randomly assigned to either the treatment or control group. The EPDS was used to screen for depression at 2-4 weeks postpartum. Beck's Depression Inventory II (BDI II) was used to measure impact on maternal mood. The Dyadic Mutuality Code (DMC) was used to examine level of responsiveness in the maternal-infant relationship.

There was no difference between intervention and control groups on depression scores as both groups had reductions. However, the treatment group was found to have a higher DMC score than the control group at time 2 in the study, and this was maintained through to time 3, the final assessment. In summary, the authors found that interaction coaching for at-risk infants and their parents (ICAP) enhanced the quality of the mother-infant responsiveness for this sample of women with postpartum depression.

These results must be interpreted with caution. Unfortunately, the range of EPDS scores was not provided at inception, and reported depression scales differed at pre and post intervention. The psychometric properties of the DMC are not provided.

Malphurs et al. (1996) conducted a study on altering maternal intrusive and withdrawn interactions with the infant. This intervention was based on the premise that maternal depression negatively affects infants' social and emotional development. The authors hypothesized that the interactions of intrusive mothers would benefit from instructions to imitate the infant, and that interactions of withdrawn mothers would benefit from attention-getting instructions.

In the initial interaction sessions, baseline assessments of mothers engaged in spontaneous play with their infants were taken to allow for assessments of behavior and interaction style. Women were then coached on interaction style. Sessions were videotaped and coded using the Global Ratings, the Interaction Rating Scale, and the Behaviour States Scale.

Table 4-6. Promoting Responsiveness Between Mothers with Depressive Symptoms and Their Infants

Author, Year, Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Horowitz,Bell, Trybulski, Munro, Moser, Hartz, McCordic, Sokol 2001 USA	Experimental, random assignment	117 I=60 C=57	Depressive Symptoms EPDS>10	3 home visits by nurses who coached mothers on maternal-infant interactions Home visits when the infants 4-8weeks old (Time 1) 10-14 weeks (Time 2) and 14-18 weeks (Time 3)	BDI II DMC Measured at Times 1, 2, and 3	No difference in depression score between groups p=0.67 Both groups had reduced depression score and increased responsiveness Intervention group had higher DMC scores p=0.006	Inconsistent use of scales to measure depression	I Fair

Table 4-7. Altering Withdrawn and Intrusive Interaction Behaviors of Depressed Mothers

Author, Year, Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Malphurs, Field, Larraine 1996 USA	Randomized controlled trial	44 mother-infant dyads 4 groups -11 per group 1) Intrusive subdivided into imitation and attention-getting 2) Withdrawn subdivided into imitation and attention-getting	Depression scores on BDI	Mothers coached on interaction style and asked to either imitate infant or capture infant's attention, based on coaching session to which the mother was allocated.	Global ratings Interaction rating scale Behavior states scale	Intrusive mothers who received imitation coaching received better global ratings scores, had significant improvement in interaction rating scale, and spent more time in optimal behavior from pre to coaching phases and pre to post phases compared to the intrusive mothers who received attention-getting coaching. This latter group only showed positive changes in behavior state during the coaching phase Withdrawn mothers who received attention-getting coaching received better global ratings, interaction ratings, and were in optimal behavior states from pre to coaching and pre to post phases Withdrawn mothers who were coached in imitation had comparable responses to the attention-getting group. All of the above reported outcomes were statistically significant on every reported parameter	Follow-up period is short Infant outcomes are not measured	I Fair

In summary, intrusive mothers who were instructed to imitate learned to reduce their intrusive interactions, and withdrawn mothers who were instructed to elicit attention learned to increase their stimulation. The results are encouraging but should be taken as preliminary as the sample size was small, the interventions vaguely described, the follow-up period short, and infant outcomes were not included. In order to assess the long-term impact of coaching on infant and child developmental outcomes, future research must investigate the longitudinal effects of providing multiple coaching sessions.

Recommendations

The results of the studies on interactive coaching are promising. There is no documented impact on maternal mood, but both studies were able to demonstrate a positive impact on maternal interaction styles with the infant. Unfortunately infant outcomes, particularly long-term outcomes have not been assessed. These findings are significant because they provide preliminary indications that maternal responsiveness can be improved. Further research should be conducted to assess both the short-term and long-term impacts of increased maternal responsiveness on infant outcomes. Currently, there is insufficient evidence to indicate the use this strategy in the prevention of adverse infant and child developmental outcomes (I Recommendation [I]). There is early evidence that suggests a short-term positive impact of interaction coaching on maternal-infant interactions. The use of such a strategy in the context of postpartum depression must be weighed carefully and made on an individual basis (I Recommendation [I]).

Group Interventions

Vines et al. (1994), conducted a pilot study which examined the effects of a community based group provided by nurses, nursing assistants, social workers and student volunteers on maternal and infant psychosocial outcomes. The premise behind this study was that mothers with depression have been reported to have more unrealistic expectations of their children and to have a greater potential for abusing their children.

The intervention involved mothers and infants in a home like setting. The mothers were encouraged to bring their infants so that staff could provide role-modeling, evaluate mother-infant attachment, and assist mothers in infant care. The control group received 2 home visits a month by a nurse for a total of 6 visits. Thirty women (fifteen per group) were recruited, and five mothers who began the parent-baby (Ad)venture (PBA) program did not complete the study.

Table 4-8. Effects of a Community Health Nursing Parent-Baby (Ad)Venture Program on Depression and Other Selected Maternal-Child Health Outcomes

Author, Year, Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Vines, Williams -Burgess 1994 USA	Quasi-Experimental	30 women I=15 C=15	Primigravida-Infant 15 days to 2 months old Mothers identified by health professionals as high risk for child abuse or neglect English speaking	Mothers and infants met 3 days/ week for 12 weeks in a homelike setting Women were taught basic infant care, parenting skills, nutrition, and stress management by nurses, nursing assistants, social workers and student volunteers	BDI Rosenberg Self-Esteem Scale Mother-infant adaptation tool Outcomes measured at 3 months	Intervention group had significant improvement in BDI ($p<0.009$) Intervention group had higher self esteem $P<0.004$ Scores of infant bonding in intervention group declined over time and scores in the home visit group improved over time. Not statistically significant	Small sample size 5 mothers in the intervention group dropped out Statistical analysis lacking in rigor Not all mothers experienced postpartum depression	II-1 Poor

The BDI scale was used to measure depression, the Rosenberg scale was used to measure maternal self-esteem, and the mother-infant adaptation tool was used to measure maternal-infant bonding. Women in the intervention group had significant changes in self-esteem and depression (see Table 4-8). Maternal-infant bonding tended to decline over time in the intervention group, an unintended result.

The results of this study must be questioned for several reasons. The sample size was small, and 5 out of only 15 mothers in the intervention group did not complete the study, which calls into question whether or not the study had the power to detect valid differences between the groups. The statistical analysis is weak and lacking in rigor.

Based on this study there is insufficient evidence to recommend group interventions as a strategy in mitigating the impact of postpartum depression on the maternal-infant relationship and infant and child development. (I Recommendation [II-1]).

Massage Therapy

Onozawa et al. (2001), attempted to determine whether attending an infant massage class, which also emphasized understanding the infant's behavioural cues, could help mother-infant interaction in mothers with postpartum depression. The effects on maternal depression were also monitored.

The mothers in the intervention group attended a weekly massage class. All mothers in the study attended a support group, the control and massage groups attending separately.

There was improvement in mood in both groups in the interval between recruitment and starting the study. There was also improvement in both groups over the course of the study, with there being greater improvement noted in the massage group. Greater improvement was noted in the massage group in terms of maternal-infant interaction.

As in the other studies, the results are interesting but very preliminary. The sample size was small, there was a significant drop out rate in the intervention group (7), nonparametric statistics were used, and it must be questioned whether or not the study had the power to demonstrate genuine differences between the two groups. It is also not possible to distinguish which aspects of the massage therapy produced benefits, which limits the use of this intervention at a practical level. This is the first controlled study to look at the use of massage therapy in the context of postpartum depression with maternal depression and maternal-infant interactions being the main outcome measures. Larger studies will be needed in order to confirm these preliminary results.

<u>Recommendation</u>

Currently, there is insufficient evidence to support the use of massage therapy as a preventive strategy in the context of postpartum depression. There is not enough evidence that it has a positive impact on maternal-infant interaction or on infant and child development (I Recommendation [I]).

Table 4-9. Infant Massage Improves Mother-Infant Interaction for Mothers with Postnatal Depression

Author, Year, Country	Design	Sample (N)	Inclusion Criteria	Intervention	Outcome Measures	Results	Limitations	Level of Evidence
Onozawa, Glover, Adams, Modi, Kumar 2001	Randomized controlled trial	34 mothers I=19 C=15	Primiparous Depressed EPDS>13	Weekly massage classes lasting 1 hour for a total of 5 weeks	EPDS done on the 1st and last day of massage class Global ratings of mother-infant interactions assessed through video recordings of interactions done on the 1st and last day of massage class	Greater improvement in mood in the massage group p=0.03 Greater improvement in maternal-infant interaction in the massage group p=0.0004	Sample size is small Significant drop-out rate in the intervention group Poor statistical analysis Unclear which aspects of massage therapy produced benefits	I Poor

Summary of the Evidence

In summary, the interventions that have been discussed in this chapter provide varying degrees of promise in terms of their potential impact on preventing and/or mitigating the impact of PPD on the maternal-infant relationship and infant cognitive, behavioral, and developmental outcomes. This is an area of study that requires further research.

All interventions were given I grades, meaning that there is currently insufficient evidence to recommend the interventions as preventive strategies in the context of postpartum depression. There are a number of caveats to this conclusion. The exercise of ranking the evidence is an iterative process. As more evidence emerges within this area of research, it is essential that the recommendations be re-evaluated in light of the new research findings to ensure that programming decisions are made using the most up to date and best available evidence. The recommendations that were provided in this chapter were based, for the most part, on a lack of good evidence. There were no cases of studies providing good or strong evidence to not implement an intervention.

Finally, all of the interventions discussed in this chapter, particularly home visiting, are routinely used as interventions in other contexts. It is important to emphasize that the conclusions and recommendations that have been provided cannot and should not be extrapolated to other program areas. These recommendations can only be interpreted within the context of postpartum depression and its impact on the maternal-infant relationship and infant outcomes.

Table 4-10. Summary of the Evidence

Intervention Strategy	Study	Research Design Rating[1]	Quality Rating[2]	Classification of Recommendation[3]
Home Visitation	Armstrong et al. (1999, 2000) Murray & Cooper (1997) Cooper et al. (2002) Seeley et al. (1996)	RCT: I RCT: I Pilot: II-1 Quasi-experimental: II-1	Fair Fair Fair Poor	I
Telephone Counseling	Thome & Alder (1999)	RCT: I	Poor	I
Interactive Coaching	Horowitz et al. (2001) Malphurs et al. (1996)	RCT: I RCT: I	Fair Fair	I
Group Interventions	Vines et al. (1994)	Quasi-experimental II-I	Poor	I
Massage Therapy	Onozawa et al. (2001)	RCT-I	Poor	I

[1] I = evidence from randomized controlled trial(s); II-1 = evidence from controlled trial(s) without randomization; II-2 = evidence from cohort or case-control analytic studies, preferably from more than one centre or research group; II-3 = evidence from comparisons between times or places with or without the intervention, dramatic results in uncontrolled experiments could be included here; III = opinion of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.

[2] Good = a study (including meta-analyses or systematic reviews) that meets all design-specific criteria well; Fair = a study (including meta-analyses or systematic reviews) that does not meet (or it is not clear that it meets) at least one design-specific criterion but has no known "fatal flaw"; Poor = a study (including meta-analyses or systematic reviews) that has at least one design-specific "fatal flaw", or an accumulation of lesser flaws to the extent that the results of the study are not deemed able to inform recommendation.

[3] A = there is good evidence to recommend this approach; B = there is fair evidence to recommend this approach; C = the existing evidence is conflicting and does not allow making a recommendation for or against use of this approach, however other factors may influence decision-making; D = there is fair evidence to recommend against this approach; E = there is good evidence to recommend against this approach; I = there is insufficient evidence (in quantity and/or quality) to make a recommendation, however other factors may influence decision-making.

Upcoming Studies and Promising Programs

Researchers working in the area of postpartum depression and the related adverse infant outcomes were contacted for additional information. Peter Cooper and Lynn Murray are two well known researchers in this field and both have studies listed in the National Research Register of the UK, and are funded by the National Health Service. These studies have evaluated a preventive intervention for postnatal depression and associated difficulties in the mother-infant relationship and infant development. The trials are complete but still under review and results cannot be disseminated. It is fair to postulate, based on early information, that the results will not likely support the initiation of preventive interventions through home visitation.

Jeannette Milgrom and her colleague Justin Bilszta were also contacted as they have worked extensively in this area. Milgrom leads a program in Australia called the Baby Happiness, Understanding, Giving and Sharing Program (HUGS). The goal of the program is to integrate direct intervention in mother-infant interactions into a systematic framework that takes into account significant variables such as cognitive style and social support (Milgrom, 1994). The program is guided by the importance of the quality of the caregiver-infant interaction for optimum infant development. It is aimed at women suffering from postpartum

depression and women who have interactional difficulties with their infants. It is based on group activities with the presence of trained nurses who attempt to improve parent observation and responsiveness through direct intervention in mother-infant dyads. The program is functional but has not been evaluated. Milgrom intends to evaluate it in the near future and it will be interesting to follow the progress of this intensive program.

Another program that Milgrom and Bilszta are leading is the national postnatal depression program in Australia that is focusing on prevention and early detection. The goal is to evaluate the feasibility of using a simple screening tool in the Australian population to identify women at risk of antenatal and postnatal depression. The aim is to improve detection of depression and to promote optimal primary care involvement. The program will cover 5 states and will screen approximately 100 000 women over a three year period ending in 2004. The grant to conduct this study comes from Beyond Blue which is a not for profit organization with a general interest in depression. The total amount awarded to the team was $3.6 million, and Public Health is involved in this project. The results of this study will be important to follow, however, they will likely not be available until well into 2005.

Finally, approximately 12 health units in Ontario were contacted to assess the status of program planning and evaluation with respect to prevention of adverse infant outcomes in the context of postpartum depression. The majority of the units contacted were in the very early stages of program planning and most were focusing efforts on social marketing campaigns in order to raise community awareness. None of the units contacted had evaluated their programs, although some did build evaluation into their preliminary logic models. More importantly, none of the units contacted had considered preventive strategies in terms of the mother-infant relationship and infant development.

Gaps

There is some evidence to support the link between postpartum depression and a strained maternal-infant relationship as well as a range of adverse impacts on infant and early child development. Unfortunately, the evidence supporting effective preventive interventions to ameliorate the impact of PPD on maternal-infant interaction and infant growth and development is limited. There are many gaps in the literature which still must be explored before effective strategies can be incorporated into policy and practice. The gaps can be summarized in the following categories:

- *Lack of adequate studies to assess both short and long-term infant outcomes such as cognitive, social, and emotional development.*

  More research of a longitudinal nature is needed in this area to examine the impact of any intervention on infant outcomes in the context of postpartum depression. Early benefits of an intervention cannot be extrapolated to potential positive long-term outcomes.

- *Geographical Bias*

Most of the studies which have been discussed in this chapter were conducted in the UK, Australia, and one in the US. More studies need to be conducted in the Canadian context before the efficacy and effectiveness of the various interventions can be determined.

Furthermore, as has already been discussed, the UK has a very well established home visiting program in place for all postpartum mothers. The studies assessing the effectiveness of a home visiting intervention in the context of postpartum depression, have been conducted within a very well organized and solid pre-existing infrastructure. The results cannot be extrapolated to the Canadian population, which has not experienced this type of service on such a large-scale.

- *Paucity of High Quality Scientific Studies*

  Many of the studies that have been published in this field of investigation have been prospective cohort studies or small trials with a short period of follow-up. Other designs of lesser scientific rigor such as pre and post test studies as well as case reports have also been published. Some of these studies have put forth interesting hypotheses, however, concrete data on the effectiveness of various preventive interventions is still lacking. Ideally, large RCTs with long-term follow-up of mother-infant dyads are needed to assess the effectiveness of preventive strategies in this area.

- *Cost-Effectiveness Studies*

  Many of the studies that have been discussed in this chapter are resource intensive interventions. Without cost-effectiveness analyses the opportunity costs of these large interventions cannot be estimated.

- *Third-Variable Effects and Mediating Variables*

  The role of genetic contributions to the mother-infant relationship and infant development has not yet been studied. As there is a genetic contribution to every behavior, including mother-infant interactions and family patterns, there is a possibility that some of the risks related to infant development in the context of postpartum depression are genetically mediated. Although this may not be a large contributing factor to the evolution of the mother-infant dyad, it is still important to consider the concepts of nature and nurture when investigating interventions. Finally, other mediating factors that should be considered when studying the success of an intervention include the role of the partner and other family members, and their ability to compensate and mediate when a diagnosis of postpartum depression is given. Successful prevention and amelioration of adverse effects will be more likely to be achieved if fathers as well as mothers are included in interventions (Caplan et al., 1989).

Conclusions

In summary, the field of investigation concerning postpartum depression and preventive strategies aimed at reducing the adverse impact of this disease on the maternal-infant relationship and long-term infant development is in the early stages of evolution. Clearly, this is an essential area of research that needs to be

further developed in order to guide policy and clinical practice. At this time, none of the discussed strategies which include home visits, telephone interventions, interactive coaching, group therapy, or massage therapy can be recommended as standards of care.

This is an expanding and promising field of study. Implementation of preventive strategies in clinical practice and in public health will continue to be a challenge until more convincing evidence emerges to guide best practice. Ultimately, preventive interventions must be investigated and seen in the broader context of public health and healthy public policy. Preventive interventions must occur in combination with other health promotion strategies. Regardless of the intervention that the evidence will ultimately support, a comprehensive approach to prevention will have to involve the coordination of key stakeholders to ensure success. The collaboration of numerous partners and reinforcing approaches will be essential, and healthcare providers will undoubtedly be key players in serving to reinforce the large-scale public health interventions and community health promotion efforts as they are developed.

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APPENDIX A: SEARCH TERMS USED TO IDENTIFY LITERATURE

postpartum depress:.mp.	post partum depress:.mp
postnatal depress:.mp.	post natal depress:.mp.
baby blues	postpartum blues
post partum blues	depression, postpartum
postpartum dysthymia	post partum dysthymia
puerperal disorders	puerperal psychosis
postpartum psychosis	post partum psychosis
risk factors	contribute:.mp.
prevent:.mp.	protect:.mp.
protective factors	perinatal depression
mother-infant relations	mother-child relations
growth	child growth
crying	child development
mother child communication	attachment behavior
cognitive development	social development
emotional development	physical development
child behavior	

APPENDIX B: LIST OF DATABASES

Medline
CINAHL- Cumulative Index to Nursing and Allied Health Literature
EMBASE- Evidence-Based Medicine
CDSR-Cochrane Database of Systematic Reviews
CCTR- Cochrane Controlled Trials Register
ProQuest
HealthStar
U.K. Department of Health Research
WHO Reproductive Health Library
CDC-MMWR (Centers for Disease Control and Prevention-Morbidity and Mortality Weekly Report)
PsychInfo
Campbell Collaborative Reviews
DARE- Database of Abstracts of Reviews of Effectiveness
Dissertation Abstract International
Evidence Based Medicine Reviews-American College of Physicians Journal Club
Web of Science
Social Science Citation Index

APPENDIX C: LIST OF KEY JOURNALS

(Reviewed for Last 2 years)

Development and Psychopathology
Infant Mental Health Journal
Developmental Psychology
Journal of Affective Disorders
Acta Paediatrica
Canadian Journal of Public Health
American Journal of Public Health
British Journal of Psychiatry
American Journal of Psychiatry
British Medical Journal
Clinical Psychology: Science and Practice
American Journal of Obstetrics and Gynecology
Applied Nursing Research
Archives of Psychiatric Nursing
Clinical Excellence for Nurse Practitioners
Journal of Women's Health
Clinical Pharmacology & Therapeutics
Clinical Psychiatry News
Comprehensive Psychiatry
Current Problems in Pediatric and Adolescent Health Care
Family Practice News
Journal of Pediatric Health Care
Journal of Pediatric Nursing
Journal of Pediatrics
Journal of Professional Nursing
Journal of the American Psychiatric Nurses Association
Nursing Outlook

Ob. Gyn. News
Pediatric News
Academic Psychiatry
Advances in Psychiatric Treatment
Annual Review of Psychology
Harvard Review of Psychiatry
Psychiatric Bulletin
Annual Review of Public Health
Journal of Mental Health
Journal of Infant and Reproductive Health
Archives of Women's Mental Health
Nursing Research
Journal of Obstetrics and Gynaecology Research
Women's Health Issues
BMC Womens Health

APPENDIX D: SEARCH STRATEGY

1.	exp Depression, Postpartum/ or postpartum depression.mp. (791)
2.	post partum depression.mp. (42)
3.	post natal depression.mp. (46)
4.	postnatal depression.mp. (361)
5.	baby blues.mp. (30)
6.	postpartum blues.mp. (38)
7.	post partum blues.mp. (17)
8.	postnatal blues.mp. (6)
9.	post natal blues.mp. (1)
10.	maternal depression.mp. (274)
11.	pregnancy depression.mp. (21)
12.	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 (1311)
13.	limit 12 to english language (1191)
14.	screening.mp. (120621)
15.	screen.mp. (25026)
16.	14 or 15 (140203)
17.	13 and 16 (123)
18.	prevention.mp. (135651)
19.	exp Primary Prevention/ or primary prevention.mp. (69009)
20.	limit 19 to english language (53929)
21.	secondary prevention.mp. (3886)
22.	tertiary prevention.mp. (312)
23.	exp Preventive Health Services/ or preventive health services.mp. (140464)
24.	preventive intervention.mp. (509)
25.	18 or 19 or 20 or 21 or 22 or 23 or 24 (323443)
26.	limit 25 to english language (246295)
27.	13 and 26 (114)
28.	exp Therapeutics/ or treatment.mp. (2364142)
29.	limit 28 to english language (1810696)
30.	INTERVENTION STUDIES/ or intervention.mp. (95143)
31.	29 and 30 (40456)
32.	13 and 31 (29)
33.	exp Randomized Controlled Trials/ or randomized controlled trial.mp. (30101)
34.	"Clinical Trial [Publication Type]"/ (0)
35.	exp Evaluation Studies/ or evaluation.mp. (719828)
36.	30 or 33 or 35 (802200)
37.	limit 37 to (english language and yr=1990-2002) (411578)
38.	30 or 33 or 35 (802200)
39.	13 and 38 (166)

CONTRIBUTORS

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Dr Emma Robertson is a Post-Doctoral Research Fellow in the University Health Network Women's Health Program. She holds a PhD from the University of Birmingham in psychiatric genetics, and with her colleagues conducted the first molecular genetic studies of puerperal psychosis. Dr Robertson holds Bachelor's and Master's degrees in psychology and has extensive research experience of severe psychiatric illness within a clinical setting. Her interests are postpartum affective illness, psychiatric genetics, psychosis, women's mental health and the use of qualitative methodologies in individual's experience of mental illness.

CINDY-LEE DENNIS, RN, PHD

Dr. Cindy-Lee Dennis joined the Faculty of Nursing at the University of Toronto after completing a CHIR-funded postdoctoral research fellowship at the University of British Columbia, Faculty of Medicine. The major foci of Dr. Dennis' research program is to rigorously evaluate the effect of social (peer) interventions on diverse maternal and infant health outcomes, including postpartum depression and breastfeeding. This is a unique area of research that contributes not only to the fields of perinatology and health promotion, but also to the delivery of health services. Currently, Dr. Dennis is the principal investigator of a large randomized controlled trial that will evaluate the effect of peer (mother-to-mother) support for the prevention of postpartum depression and is planning future research initiatives that incorporate new immigrant mothers.

SHERRY L. GRACE, MA, PHD

Dr. Sherry L. Grace is a Fellow with the University Health Network Women's Health Program. She earned her Ph.D. in Applied Social Psychology and currently holds a training award through the Canadian Institutes of Health Research. She has several peer-reviewed publications and grants, enjoys making presentations to academic and lay audiences, and has collaborated on provincial and federal government

reports on women's health. Her research interests include gender issues in referral to cardiac secondary preventive services, and diabetes self-management.

TAMARA A. WALLINGTON, MA, MD, FRCPC

Dr. Tamara Wallington is a Research/Clinical Fellow with the University Health Network Women's Health Program. She holds a FRCPC in Community Medicine and has trained in general internal medicine and public health. She has peer-reviewed publications, abstracts, and has collaborated on government reports. Her research interests include chronic disease prevention in women and prevention of violence against women.

NALAN CELASUN, MSC, PHD

Dr. Celasun is a Research Analyst with the University Health Network Women's Health Program. She holds a Bachelor's degree in Psychology, and Master's and PhD degrees in Public Health. Dr. Celasun has extensive research experience in clinical psychology and neurology within a clinical setting. She has peer-reviewed publications and has collaborated on two government reports. Her research interests include depression and neuropsychology in children, infertility and aging.

STEPHANIE SANSOM, MA

Ms. Sansom has conducted women's health research from a sociological perspective at both the undergraduate and graduate level. She has worked as a research assistant at the Institute for Scientific Analysis in San Francisco, California, USA, where she assisted with a number of projects focusing on young women involved in criminal activities and the relationships they have with their children. She has also served as a research assistant for Dr. Donna Stewart at University Health Network Women's Health Program, and is currently pursuing further graduate work.

DANIELLE ROLFE, BPHE

Danielle Rolfe is currently a research assistant for Dr. Donna Stewart at the University Health Network Women's Health Program. She has conducted research in the area of exercise-associated menstrual disturbances at an undergraduate level, and as a research assistant at the University of Toronto's Centre for Research in Girls' and Women's Health and Physical Activity. Her research interests include physical activity and health promotion among women, which she plans to pursue further at a graduate level.