A PROSPECTIVE STUDY OF PREVALENCE AND RISK FACTORS RELATED TO POSTPARTUM DEPRESSION

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A Prospective Study of Prevalence and Risk Factors Related to Postpartum Depression

by

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A thesis submitted to the

School of Graduate Studies

In partial fulfillment of the requirements for the degree of

Master of Science

Division of Clinical Epidemiology

Faculty of Medicine

Memorial University of Newfoundland

2005

St. John's Newfoundland & Labrador

Dedications

To my children Kristo, Katarina and Karmen for

the inspiration they have provided me

and to my husband Tonci for his support.

To my father Mirko and mother Vinka for the guiding presence

of their work ethic.

Acknowledgements

I would like to thank all the members of my Supervisory Committee: Dr. Doreen Neville for her extensive contribution during study design and thesis preparation and review; Dr. Patrick Parfrey and Dr. David Craig for their guidance and support; research staff of the Patient Research Centre, especially Hilary Vavasour and Neil Gladney, for their help with data collection, entry and analysis; Mrs. Judy de Para for proofreading and nursing staff at the postpartum ward of the Grace General Hospital; and all mothers who participated.

ABSTRACT

A Prospective Study of Prevalence and Risk Factors Related to Postpartum Depression

Postpartum depression (PPD) is a serious medical condition affecting many women after childbirth. Depressed mood and difficulty coping, particularly with the infant, characterize postpartum depression (Robinson, Steward, 1986). Clinical features include a pervasive state of apathy, despair, extreme fatigue, loss of appetite, insomnia, and crying spells. Postpartum depression is frequently undiagnosed. The etiology is unclear but there seems to be complex interaction between biological, psychological and social factors. The duration of the depression is unknown, since few studies have been conducted for longer than eight weeks postpartum (Jermain, 1995). For a significant percentage of women, depressive symptoms may continue for months or years after giving birth (Goodman, 2004).

The objectives of this study were: (1) to determine the natural history of postpartum depression in the sample, including onset and duration; (2) to report the point prevalence rate for postpartum depression in the sample at one month, the period prevalence rate within three months postpartum and the incidence rate for postpartum depression at three months; (3) to examine the association between selected risk factors and the development of postpartum depression, including history of previous depression, family history of depression, inadequate social support, life stress, childcare stress, maternity blues, marital

dissatisfaction, and antenatal anxiety; (4) to comment on the treatment practices currently used in dealing with postpartum depression ; and (5) to comment on the rate and time of 'onset of dropout' for mothers who chose not to participate in the study.

This prospective prevalence study involved mothers who delivered children in St. John's Newfoundland during the period from the 4th of May 1999 to the 3rd of June 1999, inclusive. The convenient heterogeneous sample consisted of 71 mothers ranging from 19-40 years of age. An interview-based questionnaire was administered while each mother was a patient on the postnatal ward. Self-complete questionnaires, were mailed to the mothers at home, at one month and three months after delivery.

The point prevalence of postpartum depression in the sample was 3.07% at one month and 3.2 % at three months, the period prevalence rate at three months after delivery was 4.8% and the incidence rate at three months after delivery was 1.6%.

Prevalence of depression, risk factors and drop out rates were compared with previous studies in postpartum depression. In general, prevalence of postpartum depression in this study is in the lower range, comparing to prevalence reported in the other studies. However, risk factors identified in this study for mothers developing depression are comparable with those previously reported.

The return rate for mailed questionnaires in this sample was 87.3%. As a result, recommendations for the conduct of a full prospective study were developed.

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CHAPTER 1: INTRODUCTION

1.1 Postpartum Depression - An Overview

1.1 .1 Description of the Disorder

Postpartum depression (PPD) is a serious and longstanding medical condition that arises after childbirth. It has been found that women are at greater risk of developing depression in the first postnatal month than at any other time in their lives (Kaplan & Sadock, 1989). Nearly one-half of patients with depressive symptoms report them within the first two weeks of the delivery; the majority of depressive episodes occur within the first three months (Sharon & Walker, 1992). The symptoms of PPD resemble that of a nonpsychotic major depressive disorder episode (Born, Zinga & Steiner, 2004). Depressed mood and difficulty coping, particularly with the infant, characterize postpartum depression (Robinson & Steward, 1986). Clinical features of this condition are a pervasive depressive state of apathy, despair, extreme fatigue, loss of appetite, insomnia, and crying spells.

Postpartum depression must be distinguished from "baby blues", which is a transient mood disturbance (resolves by the tenth day postpartum) that occurs in the majority of new mothers (range: 26-85%) after childbirth and does not affect the woman's ability to function (Epperson, 1999; Wisner, Parry & Piontek, 2002). Furthermore, PPD should be

distinguished from postpartum psychosis, which occurs in 0.2 percent of childbearing mothers within the first postpartum month and represents a psychiatric emergency that requires immediate intervention because its risk of infanticide and suicide (Epperson, 1999; Wisner et al., 2002). Postpartum psychosis involves extreme disorganization of thoughts, bizarre behavior, unusual hallucinations and delusions that often involve the infant (Wisner et al., 2002).

Diagnostic criteria of the American Psychiatric Association specify maternal postpartum mood disorder onset within 4 weeks postpartum (American Psychiatric Association, 2000). The clinical course of postpartum depression is not well characterized, but most authors agree that a large number of patients (>60%) have symptom onset within six weeks of postpartum. To meet diagnostic criteria for depression, symptoms must be continuously present for at least 2 weeks and interfere with the individual functioning (American Psychiatric Association, 2000; Remick, 2002). The complexity of depression and anxiety in relation to childbirth is also related to onset of episode, since more recent evidence shows that depressive symptoms are at least as common during pregnancy as postpartum (Glover & Kammerer, 2004). Some episodes of depression are triggered by childbirth; some appear during pregnancy and are resolved by childbirth. However, many mothers are depressed during pregnancy and postpartum. These are likely to be different episodes that may be related to different biological bases and vulnerabilities (Glover & Kammerer, 2004). Depression related to medical conditions and thyroid dysfunction or

anemia must be excluded before a definitive diagnosis of postpartum major depression is made (Epperson, 1999).

It has been found that women with postpartum depression have onset of depression at an earlier age, fewer lifetime episodes of depression, a shorter duration of symptoms, shorter time from the onset of symptoms to hospitalization, and better outcomes than those of women depressed at other times (Frank, Kupfer & Jacob, 1987; Katona 1982). In addition, researchers reported 25 to 48% of women hospitalized for a psychiatric disorder in the puerperium are diagnosed with depression (Meltzer & Kumar, 1985; Dean & Kendal, 1981; Katona, 1982). A link between childbirth and mood disorders was acknowledged in the Diagnostics and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), by inclusion of a postpartum specifier that may be applied to a current and recent major depressive episode, manic episode, or mixed episode of bipolar I or bipolar II disorder, or brief psychotic disorder. The more recent and well-designed studies do not support the concept of a phenomenologicaly unique depressive syndrome in the postpartum period and therefore argue that PPD is characterized by typical affective features, with no evidence for unique diagnostic category or symptom profile (Bloch, Daly, & Rubinow, 2003).

1.1.2 Theories of Causation

Disagreement about the cause of postpartum depression, and whether childbirth itself may be causal, is considerable. Watson and colleagues (Watson, Elliot, Rugg, & Brough, 1984) found the prevalence of PPD six weeks after birth (12%), is similar to a one-month prevalence of depression in non-pregnant mothers (14.9%) as reported by Bebbington and colleagues (Bebbington, Hurray & Tennant, 1981). Kumar & Robson (1984), however, noted that childbirth does have a particular effect on the mental health of women.

Several different theories of the etiology of PPD were described by Misri & Burgman (1992) and Gruen, (1990). *Traditional psychological or psychodynamic theories* stress the importance of family attitude toward the mother and child. A family's negative attitude can become a confounding risk for the mother's well being. The birth of a child causes changes in a woman's lifestyle and results in lack of independence. Unresolved issues from a person's family may become more troublesome following childbirth (Gruen, 1990). If the woman has not had a good maternal role model in her past, she will be less likely to interact positively with the baby who may be viewed as a difficult, rejecting object (Gotlib, Whiffen, Mount, Milne & Cordy, 1989).

Cognitive psychology theories define PPD as a form of learned helplessness that occurs in susceptible individuals. The personality characteristic predisposes mothers to PPD

(Gruen, 1990). Certain individuals have unrealistic expectations of childbirth and parenting, which may lead to feelings of failure and distortion of thoughts (Gruen, 1990). Individuals lacking adequate childcare role models are prone to experience a sense of loss of control and are unable to cope with the continuous demands of the infant. Inadequate support from a partner, family and friends increases the vulnerability of the woman, who may then experience a feeling of entrapment (Misri & Burgman, 1992).

New humanistic theories propose that rapid loss of established behavioral patterns and confusion about the role of parenthood are the basis of postpartum depression. Necessary changes in lifestyle lead to resentment toward the child who is seen as a source of change. Subsequently, the mother experiences anger. Instead of the socially promoted "normal" feelings of unconditional love, the mother experiences feelings of guilt and shame and considers herself unfit for the role of mother. The inability to openly express socially unacceptable feelings fosters depression in the mother (Misri & Burgman, 1992).

Recent research has focused on a *psychosocial model* of the origin of postpartum depression (Boyce, 2003). This model, first introduced by Brown and Harris (1978), reflects research that implicates the impact of negative life events on the onset of depression in women who had vulnerable risk factors. Boyce suggested that childbirth may play a role as provoking life event which triggers onset of depression in vulnerable women (Boyce, 2003).

Biological or organic theories support the notion that shifting levels of hormones and other biologically active molecules create change in a woman's mood. Raised cortisol levels and suppressed adenocorticorticotropin hormone (ACTH) response to corticotropin-releasing hormone (CRH) were biological findings reported with the development of postpartum blues (Okano & Nomura 1992; Magiakou, Mastorakos, Rabin, Dubbert, Gold & Chrousos, 1996). A greater sensitivity to increase and withdrawal of estrogen and progesteron and increased thyroperoxidase antibodies has also been linked to PPD (Harris, Fung & Johns, 1989; Harris, Othman, Davis, Wepper, Richards, Newcombe, Lazarus, Parkes, Hall & Phillips 1992; Kuijpens, Vader, Drexhage, Wiersinga, van Son & Pop, 2001). A postpartum affective disorder known as postpartum 'high", manifested as a mild form of hypomania, was found to be related to lower cortisol level (Taylor, Littlewood, Adams, Dore & Glover, 1994; Taylor, Dore & Glover, 1996). Other biological factors, including a genetic component such as family history of bipolar disorder (Jones & Craddock, 2001), gene polymorphism in the serotonin transporter 5-HT gene (Coyle, Jones, Robertson, Lendon & Craddock, 2000) and increased growth hormone response to apomorphine (Wieck, Kumar, Hirst, Marks, Campbell, Checkley, 1991) have been linked to vunerability to postpartum psychosis.

The hypothalamic-pituitary-adrenal (HPA) axis is increasingly recognized as important in affective disorders (Gover & Kammerer, 2004). There is a strong interaction between the HPA axis and the female reproductive system that changes during pregnancy and postpartum. It is possible that those women vulnerable to depression have different HPA

axis function causing a central suppression of the corticotrophin-releasing hormone (CHR) secretion in the postpartum, which may cause a tendency toward affective disorders (Gover & Kammerer, 2004). Biological findings for postpartum depression include a greater sensitivity to increase and withdrawal of estrogen and progesterone in model trial, and increased thyroperoxidase antibodies (Harris, Fung & Johns, 1989; Harris, Othman, Davis et al., 1992; Kuijpens, Vader, Drexhage, Wiersinga, van Son & Pop, 2001). As result of this research it is becoming common practice to assess thyroid functioning in women who develop PPD (O'Hara & Gorman, 2004). However, in the study done by Harris and colleagues, the depression in thyroid-antibody-positive women was not corrected with daily administration of thyroxin (Harris, Oretti, Lazarus, Parkers, John, Richards, Newcombe & Hall, 2002). Bloch and colleagues commented that there might be a subgroup of mothers who are especially sensitive to changes in progesterone and estradiol levels and those might be mothers who develop PPD (Bloch, Schmidt, Danaceau, Murphy, Nieman & Rubinow, 2000).

O'Hara & Gorman reviewed and commented on about certain characteristics of research related to endocrine factors. Authors commented that most of these studies address postpartum blues rather than PPD. Furthermore, they reported that research was based on the assumption that progesterone, estradiol, prolactin and cortisol levels were either too high or too low or that these hormones are changing too rapidly. As result, authors argued, there is no simple way to determine what are defined as normal or abnormal findings for biological variables in puerperium (O'Hara & Gorman, 2004).

A recent review of the biology and pathophysiology of perinatal psychiatric disorders by emphasized that all postpartum women experience hormonal changes, but only a minority develop PPD (Sharon & Walker, 1992; Glover & Kammerer, 2004). However, there is evidence that the large changes in psychoactive hormones (cortisol, progesterone, and estrogen) which occur in the peripartum period may play a part in causing psychiatric illness in some women (Gover & Kammerer, 2004).

Obstetric difficulties and complications are reported by some researchers (Campbell & Cohn, 1991; Boyce & Todd, 1992; Fisher, Astbury & Smith 1997 and Hickey, Boyce, Ellwood & Morris-Yates, 1997) to be related to the subsequent development of PPD. More specifically, obstetric factors are found as significant risk factors in a vulnerable subgroup of those mothers who present with previous history of depression or in pregnancy (O'Hara, Schlechte, Lewis & Varner, 1991; O'Hara, 1997). A meta-analysis published in 1996 reported evidence of only a non-significant trend between the effect of cesarean section and development of PPD (DiMatteo, Morton, Lepper, Damush, Carney, Pearson, M. & Kahn, 1996). A later meta-analysis did not reveal an association between PPD and obstetric factors (Beck 2001).

In summary, development of PPD is not likely related to a single theory, but rather, may be attributed to a combination of reasons (Alfonso and Domino, 1984). Vulnerability in the peripartum period likely depends on both biology and environment with different

influence on different types of disorder, in different types of individuals (Glover & Kammerer, 2004).

1.1.3 Impacts of the Illness

The debilitating effects of postpartum depression affect not only the mother, but can permeate the entire family. In particular, postpartum depression may have an adverse psychological outcome and can impair neurocognitive development of the child (Murray, 1992; Murray & Cooper, 1997). Postpartum depression can cause impaired maternal-infant interaction and a negative perception of infant behavior that can result in attachment insecurity, emotional developmental delay, and social/interaction difficulties in the child (Dennis 2004).

Delays in a child's cognitive development have been reported by Coghill and collegues, behavioral disturbances by Wrate and collegues, and poor emotional adjustment by Murray and Teti and collegues (Coghill, Caplan, Alexsandra, Robson & Kumar, 1986; Wrate, Rooney, Thomas & Cox, 1985; Murray, 1992; Teti, Gelfand, Messinger and Isabella, 1995). There is evidence that children of such mothers score significantly lower on tests of intellectual ability than those children of mothers who were not depressed (Coghill, Caplan, Alexandra, Robson & Kumar, 1986; Sharp, Hay & Pawlby, 1995) and that their emotional problems persist throughout childhood and potentially into adulthood (Sinclair & Murray, 1998; Newport, Wilcox & Stowe, 2002). Weissman and colleague reported that children of depressed parents were at higher risk of early onset of a major

depressive disorder, and at greater risk for anxiety disorders, alcohol abuse, social impairment and medical problems (Weissman, Warner, Wickramarate, Moreau & Olfson, 1997).

In more extreme circumstances, the dysfunctional state caused by depression can escalate to neglect of the child's basic needs, physical abuse and occasionally to infanticide (Kendell, Chalmers & Platz, 1987).

Many experts agree that untreated postpartum depression can last well beyond the first year and affect the family system indefinitely (Cox, Holden & Sagovsky, 1987). The impact on fathers and family members has not been researched in depth, but there is evidence that the stability of the couple's relationship may be affected and marital stress may result in separation or divorce (Dimitrovsky, Perez-Hirshberg & Istkowitz, 1983; Zukerman & Beardslee, 1987, Zelkowitz & Milet, 1996; Boyce, 1994; Holden, 1991). Ultimately, the family becomes exhausted. Members who have been supportive can become resentful as emotional resources are depleted (Gruen, 1990).

Many men whose partners experience PPD may be affected emotionally (Goodman, 2004). A study that examined the course of postpartum psychiatric disorders in mothers and their partners reported that up to 54% of mothers and 60% of their partners (who had had psychiatric diagnosis at 2 months postpartum) still had psychiatric diagnosis at six months after childbirth (Zelkowitz & Milet, 2001).

1.1.4 Treatment of PPD

Treatment for postpartum depression is similar to treatment for major depressive disorder. Treatment options were recently summarized by Parry (2004). The SSRIs and TCAs are effective medications. However sertaline, a selective serotonin reuptake inhibitor (SSRI), is the first line treatment because of fewer side effects and once a day dosing preventive therapy after delivery should be considered in mothers with a previous history of depression. Fluoxetine and norfluoxetine have long half life and continuos exposure through the breastmilk is more apt to lead to measurable serum levels compared with other SSRIs (Parry, 2004). Because most psychotropic drugs are excreted in breast milk, anti-depressants should be used with caution in the breastfeeding mother (Jermain, 1995).

Previous studies indicate that most psychotropic medications in the dosages used today do not have major teratogenic effects, but long term behavioral effects of these medications are unknown (Parry, 2004). Women who have recently given birth are sensitive to the side effects of medication (Wisner, Perel, Peindl, Findling & Hanusa, 1997). For that reason, the lowest possible dosage of medication should be used and the option of refraining from breastfeeding should be discussed (Parry, 2004).

Tricyclic antidepressants (imipramine, desipramine, amitriptyline, nortriptyline) which have been prescribed most frequently for postpartum depression in the past, are not

recently a first- line medication because of cardiovascular and other side effects (Epperson, 1999; Parry, 2004). A mother in whom depression is persistent and severe (such that she's having difficulty functioning or having thoughts of harming herself or her child) should be evaluated for antidepressant treatment with maintenance or altered dosing of psychotropic to prevent exacerbation of illness (Epperson, 1999; Parry, 2004).

Other non-pharmacological interventions should also be considered (Parry, 2004).
The different kinds of non-biological interventions recently summarized by Dennis (2004) include: interpersonal psychotherapy, cognitive-behavioral therapy and different types of psychosocial interventions such as peer support, partner support and non-directive counseling (Dennis, 2004). Treatment of choice in most cases is counseling, which can be delivered by health visitors (Cooper & Murray, 1998). Studies show that non-directive counseling on a weekly basis (received from trained health visitors in the home or from nurses at child health clinics), substantially improved maternal mood (Holden, Sagovsky & Cox, 1989; Wickberg & Hwang, 1996; Murray & Cooper, 1997). A study using fluoxedine with cognitive-behavioral therapy for postpartum depression revealed that an initial session of counseling was beneficial if followed by treatment with fluoxedine or further counseling, but there was no advantage in receiving both, as both are equally effective (Appleby, Warner, Whitton, Faragher, 1997).

Among the other interventions reported by Dennis were relaxation/massage therapy, infant sleep interventions, mother-infant relationship therapy and maternal exercise. The

author suggests that, due to a lack of well designed investigations, further research is needed to evaluate effectiveness of nonbiological treatment approaches and to determine which are most useful for women in relation to different risk factors or clinical presentation of postpartum depression (Dennis, 2004).

PPD has often been treated as solely a woman's problem and the family was not incorporated into the treatment, except as a support system (Gruen, 1990). Kraus and Redmond (1986) described how the family may help or delay the healing process for a parent experiencing PPD. Therefore it is recommended that the family be included in the treatment process as an integral part of healing (Gruen, 1990).

1.1.5 Summary of the Overview

PPD is a common and often overlooked condition (Georgiopoulus, Bryan, Wollan & Yawn, 2001), which may be unrecognized and undertreated despite availability of pharmacological treatments with acceptable efficacy (Parry, 2004).

The prognosis for the mother and child depends on timely intervention (Born, Zinga & Steiner, 2004). Mothers usually return for their postnatal follow up appointment at four to six weeks postpartum, and most women with PPD will have symptoms by this time. Many of these mothers will be experiencing depression for the first time and may be unaware of the diagnosis. As PPD has been considerably underdiagnosed, there is need for routine screening during postpartum clinic visits (Born & Zinga, 2004).

1.2 Rationale

The literature suggests that there is increasing interest being paid to the phenomenon of postpartum depression in different cultures. Reported incidence rates for postpartum depression range from less than 1% to 80%, depending on the population studied and the manner in which depression is defined and assessed (Gotlib, Whiffen, Wallace & Mount, 1991). The natural history and health intervention practice patterns of postpartum depression are a good topic for study because:

1. A baby's birth is recognized as a point for identification of mothers at risk.;
2. The prevalence of this condition as reported in the previous studies is high (10 %) (Epperson, 1999);
3. There is evidence of significant negative impact on the whole family, especially on children (Coghill, et al., 1986; Holden, 1991; Boyce, 1994; Dennis, 2004);
4. Health visitors (Briscoe, 1986; Seely, Murray & Cooper, 1996)) and general practitioners (Ancill, Hilton, Carr, Tooley & McKenzie, 1986; Kumar & Robson, 1984; Cooper & Murray, 1997) may fail to recognize postpartum depression, perhaps because some professionals assume it to be a case of the 'blues' (Cox, 1986; Hopkins, Marcus & Campbell, 1984) and because many mothers "suffer in silence" (Beck & Gable, 2000);
5. The potential for inadequate treatment of PDD is also high because of the mother's reluctance to seek help, and the reticence of physicians to treat postpartum women with drugs.

Considering the high prevalence and the nature of this condition, it would be important to identify mothers suffering from this illness and to refer them for appropriate help and treatment.

1.3 Purpose and Objectives

This study attempted to provide information about the incidence and prevalence of postpartum depression in one community, St. John's, Newfoundland and Labrador, and to identify the contributing factors most frequently associated with postpartum depression and the standard treatment practices in the community. Since the use of a self-reported questionnaire had not previously been implemented in the community for detection of depression, this study also served as a pilot study to explore the feasibility of this approach for future studies. The objectives were to:

1. describe the demographic characteristics of the sample;
2. describe the natural history of postpartum depression in the sample, including its duration and intensity;
3. report point prevalence rates for postpartum depression in the sample at one month and three months and the period prevalence rate within three months postpartum;
4. report the incidence rate for postpartum depression at three months;
5. examine the association between selected risk factors and the development of

postpartum depression, including history of previous depression, family history of depression, lack of social support, life stress, childcare stress, maternity blues, marital dissatisfaction and antenatal anxiety;

6. comment on the treatment practices currently used in dealing with postpartum depression;
7. comment on the rate and time of 'onset of dropout' for mothers who choose not to participate in the study;
8. comment on feasibility of the use of a self reported questionnaire for a community study of prevalence of postpartum depression.

1.4 Literature Review

This review of literature was performed literature by search using Medline, PubMed and PsycINFO electronic database (1980-2004), using relevant key words ("postnatal/ postpartum depression" in conjunction with epidemiology, etiology, detection, risk factors, infant, outcome, and treatment). English research papers on prevalence, community based studies, studies using the EPDS questionnaire, longitudinal studies and recent reviews were included. A review of the relevant literature concerning (a) the epidemiology of PPD, (b) the role of risk factors, and (c) the use of self-administered questionnaires to detect PPD is presented below.

1.4.1 Epidemiology of Postpartum Depression

Postpartum psychiatric disorders can be present in three forms: postpartum blues, postpartum depression and puerperal psychosis (Robinson & Steward, 1986). Despite numerous studies, these disorders have not been linked definitively with any biological or psychosocial variables. The only exception is puerperal psychosis, which is more prevalent in women with a personal or family history of bipolar affective disorder (Robinson & Steward, 1986). A recent study by Caspi and colleagues suggests that a combination of life events and genetic vulnerability contribute to vulnerability for depression in general (Caspi, Sugden, Moffitt, Taylor, Craig, Harrington, McClay, Martin, Braithwaite & Poulton, 2003).

More specifically in the postpartum period both biology and environment are involved, with different relative contributions, in different types of disorders and in the different individuals (Caspi et al., 2003).

Postpartum maternity blues occur in 15% to 85% of puerperal women (Stein, 1982; Dennerstein, Varnavides & Burrows, 1986). The syndrome is short-lived. It begins within the first week after delivery and resolves spontaneously within two weeks. It is characterized by intermittent mild fatigue, crying, anxiety, difficulty thinking clearly and sleep disturbances (Robinson & Steward, 1986).

Some women who become over-elated in the postpartum period starting the first postpartum day, develop a condition known as postpartum "high", a mild form of

hypomania that becomes a risk for later depression. It was suggested that this condition shares similar biological mechanisms with postpartum psychosis, another more rare form of bipolar disorder with postpartum onset (Glover, Liddle, Taylor, Adams & Sandler, 1994). Postpartum psychosis is serious medical condition which occurs in only 1-2 of every 1000 mothers, however the risk of recurrence is very high (Glover & Kammerer, 2004). It is triggered by childbirth and is more common in the mothers with personal or family histories of manic depression (Jones & Craddock, 2001). The mother with severe psychosis experiences hallucinations, disorganization, emotional instability and manic symptoms within two weeks of delivery (Jermain, 1995).

"Postpartum depression" is a clinical term referring to a major depressive episode that is temporally associated with childbirth (Epperson, 1999). A depressed mood, anxiety, compulsive thoughts, difficulty concentrating, poor sleep even when baby sleeping, poor appetite, agitation, irritability, loss of control, feeling of inadequacy, difficulty coping, irrational fears, fatigue, loss of libido, feelings of guilt and despair characterize postpartum depression (Goodman, 2004). The onset of depressive symptoms can occur either within the first week, or later during the first year (Goodman, 2004). For nearly one-half of patients depressive symptoms occur within the first two weeks of the delivery, with the majority of depressive episodes appearing within the first three months (Sharon & Walker, 1992; Wisner, Parry & Piontek, 2002).

Estimates of the incidence and prevalence of postpartum depression in the research are variable due to methodological inconsistencies such as definition of postpartum period, different outcome measures and different diagnostic used (Bloch, Daly & Rubinow, 2003). The studies of incidence rates of PPD range from 7.8% over 6 weeks to 14% over 12 weeks (Bloch, Daly & Rubinow, 2003), with a commonly accepted estimate that postpartum major depression disorder occurs approximately in 10% of childbearing mothers (Epperson, 1999).

According to longitudinal studies, prevalence of PPD ranges from 3 % to more than 25 % (Dennis, Janssen & Singer, 2004). The difference in the ranges can be attributed to different diagnosing criteria (major or minor depressive disorder), whether studies were retrospective or prospective (retrospective had lower rates), sample size and timing of assessment (Dennis, Janssen & Singer, 2004). The prevalence rates (2-3 months postpartum) in the studies that used conventional diagnostic criteria (e.g., Research Diagnostic Criteria; Spitzer, Endicott & Robbins, 1978) range from 9.1-14.9% (Bloch, Daly & Rubinow, 2003). Reported prevalence rate of PPD in Western countries ranges 10-15% while in non -Western countries is 5-60% indicating also that populations differ in terms of risks (Verkerk, Pop, Van Son & Van Heck, 2003). A meta-analysis that included 59 studies reported that the prevalence for major postpartum depressive disorder was 13% (O'Hara & Swain, 1996).

The clinical course of PPD is not well characterized. A significant percentage of women can continue to have depressive symptoms for months or years after giving birth (Goodman, 2004). The duration of PPD is reported to range from three months to as long as 14 months, and retrospective data suggest that duration is related to severity (Stowe & Nemeroff, 1995). A review of the studies conducting extensive follow-ups of women diagnosed with PPD reported that 25 to 50% of the subjects experienced episodes lasting six months or more (O'Hara, 1987).

While most women only experience one episode of postpartum depression, a substantial minority will relapse and experience another episode in the first year and up to 10% will be depressed throughout the first postnatal year (Kumar & Robson, 1984; Bridge, Little, Hayworth, Dehurst & Priest, 1985; Watson et al. 1984; Cox, 1986). The period prevalence during the first year postpartum (the number of women who experienced depressive symptoms at any time during the first postpartum year) has been reported as 24% (Kumar & Robson, 1984) and 27.3% (Matthey, Barnett, Ungerer, & Waters, 2000). A recent study indicated (in the case where depression persists) that there is no significant change in depressive levels during the first or second year from the early postpartum period (Beeghly, Weinberg, Olson, Kernan, Riley & Tronick, 2002).

For many women, childbirth is the stressor that triggers the start of recurrent or chronic episodes (Robertson, Grace, Wallington & Steward, 2004). The mother who experienced PPD is at risk for further episode of illness either related or not related to childbirth

(Robertson et al., 2004). The recurrence of postpartum depression following subsequent pregnancies is between 20 and 30 percent (Braverman & Roux, 1978) and for episode of illness that meets criteria for major depressive disorder is 25% (Wisner et al., 2002).

High prevalence notwithstanding, postpartum depression is frequently undiagnosed. Since women sometimes see their depression as a personal failure of motherhood (Holden, Sagovsky & Cox, 1989) or as a social stigma (McCord, 1984) it may take up to six months for them to reveal their symptoms to a health practitioner (O'Hara, 1987).

1.4.2 Risk Factors Related to the Development of Postpartum Depression

Risk factors for postpartum depressive disorder (PPD) have been discussed in numerous studies, but there is no agreed upon gold standard for the definition of the risk factors associated with PPD (Gotlib, Whiffen, Mount, Milne & Cordy, 1989; Gotlib, Whiffen, Walace & Mount, 1991). Different risk factors may be relevant during different periods.

Cheryl T. Beck (1996) used meta-analysis to define predictors of postpartum depression. The analysis identified antenatal depression, history of previous depression, lack of social support, life stress, child-care stress, maternity blues, marital dissatisfaction and antenatal anxiety as those factors having significant correlation with postpartum depression. The effect size indicator in this meta-analysis was r, which indicates the strength of relationship between postpartum depression and each of the predictor variables; (r is the abbreviation for Pearson product-moment correlation). According to Cohen' s (1988),

conventional operational definitions for the strength of r, a small effect size ranges from 0.10-0.29; a moderate effect size ranges from 0.30 to 0.49; and an effect size of 0.50 and more is considered large (Beck, 1998).

Beck later updated her findings using Advanced Basic Meta-Analysis (Beck, 2001). This study identified that ten of 13 factors had moderate effect sizes; antenatal depression, self esteem, childcare stress, antenatal anxiety, life stress, social support, marital relationship, history of previous depression, infant temperament, maternity blues. Three predictors that had small effect sizes were marital status, socioeconomic status, and unplanned/ unwanted pregnancy. Each factor is discussed below.

Antenatal Depression: Depression during pregnancy can occur during any or all of the trimesters of pregnancy. The challenges in correctly assessing depression during that time are related to the failure of traditional diagnostic criteria and assessment methods to take into account the possibility that some depressive symptoms simply reflect normal changes and stresses during the pregnancy. As a result, depression may be either under-diagnosed, if symptoms are attributed to a time-limited somatic condition, or over-diagnosed, if clinicians use self report measures solely and without carefully interviewing women to separate the symptoms of depression from symptoms of pregnancy (Affonso, Lovett, Paul & Sheptak, 1990). In the initial meta-analysis by Beck, depression during pregnancy was found to be the strongest predictor of postpartum depression, with mean r effect size of 0.51 (Beck, 1996). In the later advanced analysis, Beck reported that the mean effect of depression during pregnancy was 0.44-0.46 (Beck, 2001).

Personal or Family History of Depression: Women with a personal history of depression are also more likely to develop depression after childbirth (Cox, Connor, & Kendell, 1982; Watson, et al., 1984; Kumar & Robson, 1984), and their depression is likely to recur after subsequent deliveries (Uddenberg & Englesson, 1978; Wrate, et al., 1985). The continuity of emotional disturbance may indicate either an inherited trait or early psychological trauma (Holden, 1991).

Despite findings that personal history of depression increases the likelihood of PPD, in more than 50% of cases, PPD continues to be an index episode, underscoring the potentially unique "triggering" effect of childbirth (Stowe & Nemeroff, 1995). The original Beck meta-analysis reported only personal history as a significant risk factor for developing postpartum depression, with mean r effect size of 0.29 (Beck, 1996). In advanced analysis, the reported mean effect was 0.38-0.39 (Beck, 2001).

Although not highlighted in the Beck meta-analysis, this study decided to also test family history and include it in initial interview as a predictor factor. A positive family history of depression has been reported in retrospective, cross-sectional and prospective studies as a risk factor which increases the likelihood of developing PPD (Stowe and Nemeroff, 1995).

Antenatal Anxiety: Antenatal anxiety refers to feelings of uneasiness or apprehension concerning a vague, nonspecific threat. It can occur during any trimester and the relationship between antenatal anxiety and postpartum depression can be considered in the range of moderate effect size. The mean r ranged from 0.30-0.36 (Beck, 1996) to 0.41-0.45 (Beck, 2001).

Maternity Blues: Postpartum blues, also called 'third day syndrome,' seems to be a possible predictor of a later postnatal depression. Symptoms of this transitory phenomenon, which can last up to ten days postpartum, are: hyper-sensibility, tearfulness, feeling of slowness and difficulty concentrating, anxiety, no positive affection towards the infant, instability and labile moods. The mean r effect size for maternity blues in meta-analysis ranged from 0.35 (Beck, 1996) to 0.25-0.31 (Beck, 2001).

Childcare Stress: Stress related to childcare of the infant and siblings has an impact on the mother, especially if it is combined with a lack of social and emotional support. The burden is multiplied if the infant is experiencing health problems and difficulties pertaining to feeding and sleeping. The perception of the temperament of the infant as fussy, irritable, or difficult to console can add to childcare stress. In the Beck (1996) meta-analysis, the mean r effect size of childcare stress for postpartum depression was 0.48 and in the later analysis a mean r effect size of 0.33-0.34 was reported (Beck, 2001).

Stressful Life Events: Life stress is an index of stressful life events during pregnancy and postpartum. Stressful life events were referred to in the literature either as positive or negative and they include experiences such as marital changes, occupational changes and crises (such as accidents, illness, financial crises). The mean r effect size for life stress in the Beck meta-analyses ranged from 0.40 (Beck, 1996) to 0.38-0.40 (Beck, 2001).

Lack of Social Support: The definition of social support includes receiving practical support (instrumental) in care for the infant, and emotional support for the mother. Structural features of a woman's social network consist of the size of her network (partner, family and friends), proximity of its members, frequency of contact, and number of confidants with whom the woman can share personal matters. Lack of social support occurs when a woman perceives an inadequate amount of instrumental or emotional support (Beck, 1998). The mean r effect size for lack of social support in Beck meta-analyses ranged from 0.39 (Beck, 1996) to 0.36-0.41 (Beck, 2001).

Marital Dissatisfaction: A high degree of marital dissatisfaction has been shown to be a significant variable associated with development of PPD. The satisfaction with a marital relationship includes how happy or satisfied the woman is with certain aspect of her marriage, such as communication, affection, similarity of values, mutual activity and decision-making and global well being. A moderate effect size was obtained in the meta-analysis between marital satisfaction and postpartum depression. The mean r effect size ranged from 0.35 (Beck, 1996) to 0.38-0.39 (Beck, 2001).

Other Possible Risk Factors: Watson et al., (1984) did not find social class, marital status or parity to be associated with postpartum depression. However, in the Beck meta-analysis (2001) marital status, socioeconomic status, and unplanned/ unwanted pregnancy were reported as small effect risk factors.

Research findings have not consistently demonstrated a positive relation between postpartum depression and obstetric risk or complications. Some studies found that obstetric factors did increase the risk (Hannah, Adams, Lee, Glover & Sandler, 1992; Campel & Cohn, 1991; Boyce & Todd, 1992; Fisher et al., 1997; Hickey et al., 1997) whereas others found that they do not increase the risk (Cox et al., 1982; Pitt, 1968; Gennaro, 1988; Paykel, Emms, Fletcher & Rassaby, 1980; O'Hara, Rehm, Cambell, 1983) or have no association with PPD (Cox, Connor & Kendell, 1982; Playfair, Gowers, 1981). A logistic regression analysis performed by Chaudron and colleagues indicated that breastfeeding, mode of delivery, family income, parity, mother's education or obstetrical variables do not predict depression (Chaudron, Klein, Remington, Palta, Allen & Essex, 2001). However, in a study by Alder & Cox (1983), mothers who breastfed were found more likely to experience depressive symptoms.

All thirteen risk factors selected by Beck were recently included in the PDPI-Revised form that should be used to monitor a mother's risk for each trimester through pregnancy and in postpartum because the mother is at risk to develop depression at any time during the first year postpartum (Beck, 2002). The findings of studies that explore risk factors associated with postpartum depression were summarized in the table below (Table 1), and presented in greater detail in Appendix A.

Table 1. Summary of Studies Related to Risk Factors

Study Authors (Year)	Study Design Sample Size	Timing of Observation	Study Findings – Reported Risk Factors
Cox, Connor & Kendell, (1982)	Prospective n=105	20th w pregnancy-five months postpartum	Anxiety during pregnancy, postpartum blues, problem with marital relationship.
O'Hara, Neunaber, Zekoski (1984)	Prospective n=99	2nd trimester- six months postpartum	Depression during pregnancy, personal vulnerability, life stress, attribution style and self control attitudes.
Kumar & Robinson (1984)	Prospective n=119	Start during pregnancy to four years postpartum	Depressive neurosis during pregnancy, marital conflict and emotional instability of spouse.
Watson, et al., (1984)	Prospective n=190	16th week of pregnancy to first year postpartum	Positive psychiatric history , emotionally labile during pregnancy and marital problems.
Gotlib, Whiffen, Wallace & Mount, (1991)	Prospective n=730	Started during pregnancy to four weeks postpartum	High levels of depressive symptomatology during the pregnancy, lower marital satisfaction, higher stress, a greater use of escape-avoidance as coping strategy, more negative perceptions of the caring they had received from their own parents. Being under stress and unsatisfying intimate relationships, was associated with slower recovery from depression.
Campbell, Cohn, Flanagan & Clare, (1992)	Prospective, Case-control n=129	24 months follow up during pregnancy to to postpartum	Measures of personal and family history, mother's adaptation to pregnancy, minor pregnancy and delivery complications, infants as more difficult to care, husbands as less supportive, less positive engagement and more negative affect toward infant at 2 months.
Schaper, Rooney, Kay & Silva, (1994)	Prospective Prevalence n=287	Six week postpartum	Marital instability, lack of medical insurance, personal or family history of depression.
O'Hara & Swain (1996)	Meta-analysis 59 studies included		Past history of psychopathology and psychological disturbance during pregnancy, poor marital relationship and stressful life events, low social status.

Table 1. Summary of Studies Related to Risk Factors (continued)

Nielsen, Videbech, Hedegaad, Dalby and Secher, (2000)	Prospective Community n=5252	Up to 4 months postpartum	Psychological stress in late pregnancy, perceived social isolation during pregnancy, high parity, positive history of psychiatric disease before pregnancy.
Lee, Yip, Leung & Chung, (2000)	Prospective n=330	Six weeks postpartum	Depression during the pregnancy, elevated depression score at the delivery, and prolonged postpartum blues, temporary housing , financial difficulties, two or more induced abortions, past psychiatric disorders and elevated neuroticism scores.
Webster, Lianne, Dibley & Prichard, (2000)	Prospective n=901	Up to 16 weeks postpartum	A past history of postpartum depression, low social support, personal history of mood disorders.
Zelkowitz & Milet, (2001)	Prospective n=98 couples	2- 6 months postpartum	Lower socioeconomic status, country of origin, life stress, depressive symptoms before or during pregnancy.
Chaaya, Campbell, Kak, Shaar, Harb & Kaddour, (2002)	Prospective n=396	From one day to 5 months postpartum	Lack of social support, antenatal depression, life stress events, history of depression before in life, vaginal delivery, little education, unemployement & chronic health problems.
O'Hara & Gorman, (2004)	Review		Current & past history of depression and anxiety, negative life events, marital discord and poor social support.

1.4.3 Use of Self-Administered Questionnaires to Detect PPD

Previous studies have recommended the use of formal screening tools as an adjunct to routine clinical assessment for identifying women with PPD. There are several options for assessment of postpartum depression: clinical interviews with a psychiatrist; structured clinical interviews, observer-rated scales and self-report questionnaires. Self-reporting scales are instruments used for screening of community and identifying mothers

who are at risk to develop depression. Standardized psychiatric interviews have been used alone or in conjunction with self-reported scales in order to make a definitive diagnosis of postpartum depression.

The Standardized Psychiatric Interview, SPI (Goldberg, Cooper, Eastwood, Kedward & Shepherd, 1970) has often been administered in studies of postpartum depression to apply the Research Diagnostic Criteria for diagnosis of both minor and major depression (Cox, Murray & Chapman, 1993; Cox et al., 1982; Watson et al., 1984; Kumar & Robson, 1984). The SPI was also used in conjunction with more stringent criteria for diagnosing depression such as the Diagnostic and Statistical Manual of Mental Disorders III-R or more recently IV edition (Cutrona & Troutman, 1986).

The Schedule for Affective Disorders and Schizophrenia, SADS (Endicott & Spitzer, 1978) is another interview schedule frequently used in studies of postpartum depression. The interview is administered alone or in conjunction with a completed self-report questionnaire. **SADS-L**, the life- time version, has also been used in studies which examine long term effects of maternal depression on their children. This interview is used to establish the mother's psychiatric state over a longer period of time (Ednicott & Spitzer, 1978).

Except for self-reported scales, all other instruments are time consuming or, as in the case of observer-related scales, require some form of training in their application. The

availability of valid screening instruments, which can be repeatedly used on the same sample population, would contribute to the clarification of the course of postpartum depression in the community. Repeated interviewing of relatively large numbers of subjects is generally not economically feasible (Nott & Cutts, 1982).

An overview of the self-reported scales most commonly used in detection of PPD is provided below.

The Beck Depression Inventory, BDI, (Beck, Ward, Mendelson, Mock & Erbaugh, 1961) has been used as a self-report measure of the severity of depressive symptoms. It is a 20-item self-administered questionnaire that measures presence of depression. A subject is defined as depressed if they score higher than 9 on the BDI. Although originally designed to measure endogenous depression (Ugarriza, 1995), the Beck Depression Inventory has been used in general depression research and in several studies related to postpartum depression (Curtona, 1983; Manly, McMahon, Bradely & Davison, 1982; O'Hara, Neunabern & Zekoski, 1984; Atkinson & Rickel, 1983; Gotlib, Whiffen, Wallace & Mount, 1991). Some studies reported an inability of the scale to identify symptoms of women with PPD (O'Hara, Rehm & Campell, 1983; Harris, Huckle, Thomas, Johns, and Fung, 1989; Whiffen, 1988; Ugarriza, 1995).

The Edinburgh Postnatal Depression Scale, EPDS (Cox, Holden & Sagovski, 1987) is a short, self-administered instrument, specifically developed for the screening of postpartum depression (See Appendix B).This instrument is the most frequently used instrument to assess postpartum depressive symptomatology and to identify at -risk mothers (Beck, 2001). It is a 10-item questionnaire designed for use by primary health workers. Each item is scored on 4-point scale (from 0-3), the minimum and maximum total scores being 0 and 30, respectively. The EPDS rates the intensity of depressive symptoms present within the previous 7 days. EPDS is widely used for both research and clinical purposes. If the patient initially scores above the threshold on the EPDS and again upon retest two weeks later, the results will almost certainly indicate that the patient is experiencing depression (Holden, 1991).

The EPDS has been shown to be superior to the Beck Depression Inventory in the postpartum period (Pritchard & Harris, 1996,), and has shown to be equal to observer-rated scales: the 17-item Hamilton scale (Hamilton, 1960) and the Montgomery-Asbeg Depression Rating Scale (Mongomery & Asberg, 1979; Stein, Cooper, Campbell, Day & Altham, 1989) and Raskin (Payrkel, Emms, Fletcher & Rassaby, 1980; Holden, 1991). The EPDS rates the core features of low mood, ahedonia, anxiety, and sleep disturbance due to anxiety (Prichard & Harris, 1996). It also has been validated in different samples including a community sample, and has been demonstrated to have acceptable sensitivity, specificity and positive predictive values for depression when compared to diagnosis of major depressive disorder in the postnatal period through psychiatric interview (Murray

and Carothers, 1990). Strengths of the EPDS include ease of use and acceptability to women. Schaper, Rooney, Kay and Silva (1994) report that primary care workers welcome the use of the EPDS; a majority (83%) said that the scale increased their awareness of PPD, while 92% reported having referred patients with high EPDS scores for treatment. Holden (1991) has suggested that completing and reviewing the EPDS encourages women to think about their feelings and offers them an opening to discuss them more fully.

The EPDS questionnaire was created to overcome limitations of other depression scales for screening mothers in the postpartum period (Dennis, 2004). It has well documented reliability and validity in multiple languages (Affonso, De, Horowitz & Mayberry, 2000), widespread usage and sound psychometric properties (Dennis, 2004). The main difference with other scales is its administration ease, including via telephone, uncomplicated interpretation, high maternal acceptance and simplicity of incorporation into routine practice (Cooper & Murray, 1998; Dennis, 2004).

An overview of the studies that validated the EPDS is provided in Appendix B. The threshold level in the EPDS validation studies varies from 9-13, with a score of 9 or below designated as a non-case (Cox et al., 1987), and a score of 12+ designated as a likely case of depression (Holden, 1991). With a threshold score of 12/13, scale sensitivity was 86%, specificity 78%, and positive predictive value was 73 % (Holden, 1991).

Investigators suggested that EPDS should be applied during the first three months postpartum, preferably at eight weeks. Repeated scores above the threshold two weeks after initial screening almost certainly indicate depression (Holden, 1991). After initial screening, all subjects who score above normal should be further evaluated by a primary care worker and referred for appropriate help or treatment (Holden, 1991).

Before using the instrument in a culturally specific population, the EPDS should be translated and validated on a randomly selected population (Holden, 1991). A representative sample of that population should be interviewed in order to validate the instrument, by implementing as a "gold" standard either the Research Diagnostics Criteria (RDC; Spitzer, Endicott & Robins, 1978) for the diagnosis of minor and major depression (Cox et al., 1987) or the more stringent DSM-IV (Susman, 1996) criteria for major depression.

One disadvantage of the scale is that it cannot define the severity of depression. Use of a lower threshold point will increase sensitivity, but will lower specificity.

1.4.4 Summary of the Literature Review

Estimates of the prevalence and incidence postpartum depression are variable due to methodological inconsistencies such as definition of postpartum period, different outcome measures and different diagnostic criteria (Bloch, et al., 2003). The studies of incidence rates of PPD range from 7.8% over 6 weeks to 14% over 12 weeks (Bloch, et al., 2003). Reported prevalence rate of PPD in Western countries ranges from 10-15% (Verkerk, et al., 2003).

There has been considerable research on risk factors and a summary of these studies was presented in meta-analyses (Beck, 1996; O'Hara and Swain, 1996; Pope, Watts, Evans, McDonald & Henderson, 2000). Risk factors related to development of PPD as reported in Beck's meta- analysis (1996) include: antenatal depression, antenatal anxiety, childcare stress, life stress, social support, marital relationship, history of previous depression and maternity blues. In an updated meta-analysis report (Beck, 2001) self-esteem, marital status, socioeconomic status, and unplanned/ unwanted pregnancy and infant temperament were also included. Recent research has focused on a psychosocial model originally introduced by Brown & Harris (1978) which demonstrates the impact of life events on the onset of depression (Boyce, 2003).

Diagnosis of PPD is generated from exclusive use of a self -reported questionnaire (on one or multiple occasions) or in conjunction with psychiatric interviews using diagnostic criteria such as RDC (Spitzer et al., 1978) or the more stringent DSM (American

Psychiatric Association, 1994) criteria. For the purpose of screening a community for the presence of PPD, self reported questionnaires were found acceptable since interviewing a large population is not a feasible alternative. Among the self-reporting questionnaires, the EPDS scale is reliable, and comparable with the other most frequently used BDI scale; it is simple, acceptable to mothers and is recommended for use in the community screening of PPD (Stowe & Nemeroff, 1995; Holden, 1991).

CHAPTER 2: METHODS AND PROCEDURES

2.1 Research Design

This investigation was designed as a prospective prevalence study of postpartum depression. There were three data collection points: an initial interview by the researcher while the mother was in hospital, followed by completion of self-administered questionnaires by the mother at one month and three months postpartum.

2.2 Setting

The initial interview was held in the mother's room at the Grace General Hospital maternity ward. This hospital is the only referring site for expecting mothers in the area of the St. John's Health Care Corporation. The letters, with the questionnaires, as well as the report of the mother's score on the questionnaires, were mailed to the mother's home.

2.3 Sample

The target population for this study consisted of mothers who recently delivered their infant, more precisely, one day after labor. The inclusion criteria for the mother was that she be a resident of the St. John's Health Corporation Region, be 19 years of age or older

and be competent to give consent. This study was a pilot study to test the feasibility of conducting a full study. The investigator decided to include all mothers willing to participate in the study during the one month of recruitment period at the postnatal ward.

2.4 Sample Recruitment

The mothers were approached on the first day after childbirth at the Grace General Hospital, St John's, Newfoundland, between 4th of May to 3rd of June 1999. All practicing obstetricians in this hospital were previously notified by letter about onset and purpose of the study. They were informed about the study protocol and invited to contact the study investigator if they wished to express any concerns. The study investigator suggested to practitioners that they could notify expecting mothers about the opportunity for participation in the study during their stay in the maternity ward. A nurse manager used a script for initial contact with a mother that explained aims of the study related to detection of postpartum depression. The mother was asked if she was willing to be introduced to the investigator regarding participation in a study.

The investigator visited all mothers who agreed to be contacted and briefly explained the purpose of the study. A consent form was given to the mother and time (up to one day) was allowed for the mother to make a decision. If the mother decided to take part in the study, a consent form was signed and an initial interview followed. The investigator collected data on the demographic characteristics of the participant, as well as on the risk

factors related to postpartum depression. Reasons for non-participation were not systematically collected but were recorded if the mother volunteered that information.

2.5 Sample Retention Strategies

In similar studies where the EPDS questionnaire was mailed to mothers, the dropout rate ranged from 3% to 33%. Cox et al. (1993) and Murray & Carothers (1990) had a drop out rate of 3%; Appleby, Gregorrire, Platz, Prince & Kumar, (1994) reported a drop out rate of 23%; and Fossey , Papiernik & Bydlowski (1997) reported a drop out rate of 33%. It is difficult to explain the variation in return rate among the studies, except that there were probably some variances in acceptability of the EPDS in different study populations, and differences in the follow-up strategies employed. For example, a higher return rate was observed in the studies where additional letters (or phone calls) were sent to remind mothers who did not return the questionnaire (Murray & Carothers, 1990; Cox et al., 1993). In this study, mothers were prompted to return the mailed questionnaire via telephone calls, followed by a letter. Those participants who did not return the questionnaire within a week were contacted by phone. If this failed, the mother was sent an additional questionnaire with a follow-up letter reminding her that a response had not been received from her. If the mother did not respond to the second mailing, she was considered to be discontinued from the study.

2.6 Ethical Review

Approval was granted by the Memorial University of Newfoundland Faculty of Medicine Human Investigation Committee prior to initiating sampling (see HIC approval, Appendix C). Information that was recorded about mothers was kept confidential. All personal identifying characteristics were removed from the questionnaire. To protect the mother's identity, the questionnaire and interview information were identified by a code number. The signed consent form (Appendix D) and the list that connects the mother's name and code number were locked in a separate cabinet away from the information files. Each mother was reassured that neither her name nor identity would be used for publication, teaching or publicity purposes.

2.7 The Instruments

Questionnaires administered in the study were: The Checklist for Demographic Characteristics, the Postpartum Depression Prediction Inventory (PDPI) and the Edinburgh Postnatal Depression Scale (EPDS). Each is described below.

2.7.1 Checklist for Demographic Characteristics

The Checklist for Demographic Characteristics (Appendix E) was created by the investigator and designed to collect information on characteristics of mothers in the puerperium (as suggested in the literature). The questionnaire was reviewed by a psychiatrist and was found to be relevant and appropriate to this population. Areas addressed included: pregnancy week of delivery, baby's birth weight, place in the family, age of children at home, mother's age, marital status, employment, housing arangment and partner's employment status.

2.7.2 Postpartum Depression Predictiors Inventory (PDPI)

The Postpartum Depression Predictiors Inventory (PDPI) (see Appendix F) was created by Beck (1996) to be incorporated into antenatal history and postpartum assessment forms in order to recognize mothers with high risk of developing PPD. The inventory was not validated; however, the questions were based upon the results of a meta-analysis completed by Beck (1996). Areas addressed included: history of depression during the pregnancy including duration and severity; history and duration of anxiety during the pregnancy; any previous history of depression prior to the recent pregnancy, onset, treatment and physician care for depression; emotional and instrumental support from the partner, family and friends; ability of the mother to confide in her partner, family and friends; marital satisfaction; presence of major stress events such as financial, marital,

death or serious illness in the family, moving, unemployment and job change. For this study, an additional question related to family history of mental disorders (extracted from the Antenatal Screening Questionnaire created by Applebly, Gregore, Platz, Princes and Kumar (1994) was added to the original PDPI questionnaire.

2.7.3 Edinburgh Postnatal Depression Scale

As mentioned in the literature review, the Edinburgh Postnatal Depression Scale (EPDS) is a self-report scale that is short, easily understood, and easy to administer and score (Appendix B). The EPDS consists of 10 statements related to symptoms of depression experienced in the previous seven days. There are four possible responses for each question, indicating levels of severity. The items are scored from zero to three and, when totaled, provide a score that indicates the likelihood of depression. A good time to introduce the scale is six to eight weeks after birth, although not every woman who scores highly at this early stage will require active treatment. A repeated score above the threshold after two weeks almost certainly indicates depression (Holden, 1991). A cut off score 12/13 was found in previous studies to identify the most seriously depressed women, but a score of 9/10 might be appropriate if the scale was considered for routine use by primary care workers because it increase sensitivity for purposes of community screening (Cox et al., 1987; Murray & Carothers, 1990; Zelkowitz & Milet, 1996). Mothers scoring nine to 12 in this study were considered at a potential risk of developing depression, and the mother scoring greater than 12 was considered at a risk of depression, or likely to be experiencing depression. For all mothers a letter was sent home indicating

a score level with explanation and mothers who scored above the threshold were also advised to contact GP or community health nurse to found out if they needed further care.

As reported in the preceding literature review and in Appendix B, the Edinburgh Postnatal Depression Scale was extensively tested with different samples including community samples of postnatal mothers in various cultures, and was found to be superior to other scales previously used in related research.

2.7.4 Reliability

The investigator completed the initial interviews. All participants were interviewed in a uniform fashion; the setting for the personal interviews was similar (mother's room at the postnatal ward). The investigator assured a confidential environment by providing privacy during the interview. All questionnaires were completed in the privacy of the woman's home.

2.7.5 Pre-test

Pre-testing of all instruments to be used in the study was conducted once the Human Investigation Committee approval for the study was received. For this purpose, the investigator asked permission from the Health Care Corporation of St. John's to approach

mothers attending breastfeeding groups. For each instrument, we asked five mothers to review the instrument and complete Evaluation of Instrument Forms (Appendix G). The investigator provided all instructions regarding the completion of the questionnaire, and was available to answer any questions. The questions asked by the pre-test subjects were related to language, clarity of content and time needed to complete the study questionnaire.

Responses to all three instruments were examined. The majority of the mothers evaluating the instruments agreed that the questionnaires were not offensive and did not take too long to complete; the individual questions were understandable and suitable for mothers in the postpartum period. Two mothers out of five evaluating the EPDS gave a comment on the question number six: "Things have been getting on top of me." Their comment, since this was not a common expression in their community, was that the question could be worded differently though they understood its meaning. The investigator did not change the wording of this question since mothers said they were able to understand the content.

2.8 Data Analysis

All questionnaires were coded and entered into the Paradox computer program, which was used to determine frequencies. The data was then exported to a SPSS statistical package, version 7.5. Descriptive statistics including frequencies, median and standard

deviation of mean (SD) were utilized. For analysis of the relationship between categorical variables, chi-square and for ordinal Mann Whitney-U test was used, with probability level set at $p<0.05$. The purpose of data analysis included the following:

1. To describe basic demographics of the sample;
2. To describe the frequency of the most common risk factors associated with postpartum depression including history of previous depression, family history of depression, lack of social support, life stress, childcare stress, maternity blues, marital dissatisfaction, and antenatal anxiety;
3. To report the point prevalence (number of existing cases of a disease at one month over total number of subjects involved in a study) for postpartum depression in the sample at one month, and the period prevalence rate (number of existing cases of a disease over the three month of study over total number of subjects involved in the study) within three months postpartum;
4. To report the incidence rate (number of new cases of disease in the three month period from the total number of mothers in the study at three months) for postpartum depression at three months;
5. To comment on the demographic characteristics in the three main scoring groups in the sample;
6. To report on risk factors most positively associated and multiple comparison analysis of those with the above normal EPDS scoring levels;
7. To comment on current treatment practices for dealing with postpartum depression in the community;

8. To comment on the rate and time of 'onset of dropout' as well as describe basic demographic characteristics such as: age, parity and marital status for the mothers who chose not to participate in the study.

CHAPTER 3: FINDINGS

Following a presentation of the response rate and sample characteristics, findings are organized and presented according to study objectives.

3.1 Response Rate

One hundred and twenty one (121) mothers were eligible to participate in the study and 71 agreed to do so (58.6% response rate). All mothers were able to speak English. For those mothers who chose not to participate (n=50, data available for 47), the investigator collected data on three variables, in order to compare participants with non-participants (mother's age, parity and marital status). The t-independent test was applied to compare maternal age and did not show any significant difference between two groups. Chi - square was used to compare parity and marital status. Only the marital status was shown to be significantly different between groups, with p= 0.017. In the non-participant group we had fewer married (72.3% vs. 77.5%) mothers and mothers in common-law relationships (8.5% vs. 18.3%) but more single parent mothers (19.1 % vs. 4.2%) than in the participant group.

3.2 Characteristics of the Sample

A cohort of 71 mothers who gave birth and were admitted to a postnatal ward participated in the study. Frequencies and central tendencies for the variables discussed below are indicated in the Checklist for Demographic Characteristics (Appendix E) and The Postpartum Depression Predictors Inventory (Appendix F).

The demographic data collected for the sample included: mother's age, marital status, parity, gestational week at delivery, baby's weight, number of children at home and their age, employment status of the mother and her partner, and housing arrangements. These data are presented in Table 2 and summarized below.

The mean age of mothers was 30.1 years with a range of 19 to 40 years. The majority of mothers delivered between 39- 41 gestational weeks, with a mean of 39.3 weeks. Only one mother delivered twins and the rest delivered singletons. Forty-two percent (42.3%) of mothers were primiparae, i.e. this was their first child and 45.1% had one child at home. For mothers who had one child at home, the age of the child ranged from 1 to 17 years old, with the majority of children between one and five years of age (78.9%).

The majority of mothers were: married (77.5%); employed (51% full time and 21.1% part-time); living with partners who were employed full time (84.1%); owned their own home (76.1%) and did not share a home with their extended family.

During the assessment interval at one month postpartum, 25 mothers needed reminding either only by call (25) or with an additional letter (10) to send the questionnaire back. Of the 25, 15 responded after only a telephone call, and three after a letter, leaving seven who did not responded after either call or letter. Of those seven mothers, six discontinued the study at one month and in one case the questionnaire may have been lost in the mail. As a result the response rate for subsequent calls was 60% (15/25) and for mailings was 30% (3/10) at one month. During the third month follow up 21 mothers needed a reminder either only with a telephone call (21) or with an additional letter (3) to send back their questionnaires. From those, 18 responded after only a call, and one after the additional letter. As a result, the response rate for at telephone call reminders was 86% (18/21) and for mailings was 33% (1/3) at three months leaving two mothers who discontinued the study at three months postpartum.

Table 2: Demographic Characteristics of the Sample (n=71)

Characteristics	N	%
Age of mothers (years)		
Less than 25	7	9.9
25 – 29	24	33.8
30 – 34	28	39.4
35 and over	12	16.9
Pregnancy week at time of delivery		
35	1	1.4
36	1	1.4
37	1	1.4
38	7	9.9
39	12	16.9
40	23	32.4
41	22	31.0
42	4	5.6
Baby's birth order in the family		
First	30	42.2
Second	32	45.1
Third	7	9.9
Forth	2	2.8
Marital status of the mother		
Married	55	77.5
Common-law relationship	13	18.3
Single parent	3	4.2
Employment status – Mother		
Full time	36	50.7
Part time	15	21.1
Housewife	19	26.8
Student	1	1.4
Employment status- Partner		
Full time	57	80.3
Part time	5	7.0
Unemployed	3	4.2
Student	3	4.2
Missing	3	4.2
Housing arrangement		
Own house	54	76.1
Renting	17	23.9

3.3 Factors Related to the Development of Postpartum Depression in the Sample

3.3.1 Risk Factors Related to Antenatal Period

3.3.1.1 *Personal History of Depression, Including History of Depression During the Pregnancy*

Questions related to personal history of depression in the mother included previous (pre-pregnancy) episodes of depression in life and experiences of depression during the current pregnancy. In the case of a positive previous history of depression, additional questions were asked related to dates and duration of episodes, as well as whether the patient was under a physician's care, and if the physician had prescribed any treatment.

(a) *Pre-Pregnancy Experience of Depression.* In this sample, 13 (18.3%) mothers reported being depressed sometime before their most recent pregnancy. Nine of them (69.2%) were under a physician's care, and three (23.1%) had medication prescribed for treatment of the depressive episode. For mothers who provided the duration of the depressive episode, the range of the duration was from one to 24 months, with a mean number of months of 9.9, and a standard deviation of 9.5. as shown in Table 3 below.

(b) *Depression During Current Pregnancy.* During the interview in the hospital, the mother was asked if she had been feeling depressed during her pregnancy. If the mother reported having had depressive symptoms during the current pregnancy, additional questions were asked related to dates, duration of the episode and patient's personal judgment of the severity of symptoms.

Ten mothers (14.1%) reported feeling depressed during the pregnancy. The duration of the depressive episode ranged from one to nine months; the mean duration was 3.7 months (S.D. of 3.2 months); 7 of these mothers described the episodes as mild in nature and 3 described their feelings of depression to be of moderate severity (Table 3).

3.3.1.2 *Antenatal Anxiety*

During the initial interview, the mother was also asked if she was feeling anxious during the current pregnancy. If she answered yes, she was then asked to state the duration of this anxiety episode in months. Thirty-one percent (31%) of mothers reported that they experienced some degree of anxiety, with duration ranging from 1-9 months, a mean of 4.55 months and S.D. of 3.89 months. For 50% of mothers, this anxiety episode lasted only one month. The majority of mothers experienced anxiety toward the end of the pregnancy but 40.9% reported that they were anxious during the whole pregnancy (see Table 3).

3.3.1.3 *Family History of Mental Disorders*

In the initial interview the mother was asked whether she had any close relatives who had experienced a course of psychiatric treatment either as an in-patient or out-patient. Twenty-two mothers in our sample had a close relative who had suffered from mental conditions (31%) and had a course of psychiatric treatment as in or out patients. The most commonly reported mental condition was depression (Table 3).

Table 3: Antenatal Psychiatric Risk Factors

Depression Before Recent Pregnancy	N	%
Have you ever been depressed before this pregnancy?		
Yes	13	18.3
No	58	81.7
Have you been under a physician's care for that episode?		
Yes	9	69.2
No	4	30.8
Did the physician prescribe any medication for your depression?		
Yes	3	23.1
No	10	76.9
Depression During Recent Pregnancy		
Have you felt depressed during your pregnancy?		
Yes	10	14.1
No	61	85.9
If yes, what was the severity of the depression?		
Mild	7	70.0
Moderate	3	30.0
Anxiety During Pregnancy		
Have you been feeling anxious during your pregnancy?		
Yes	22	31.0
No	49	69.0
Family History of Mental Disorders		
Has any close relative had a course of psychiatric treatment?		
Yes	22	31.0
No	49	69.0

3.3.1.4 *Marital Satisfaction*

In the literature, lack of marital satisfaction was reported to be related to the development of postpartum depression. The majority of mothers in this sample reported satisfaction with their partners (98.5%). One mother reported dissatisfaction with her current relationship. Mothers who were not currently living with the father (3) were asked additional questions regarding unresolved relationship issues with the father; two mothers in this category reported continuing having unresolved issues. Two of those mothers did not respond to the mailed questionnaire at one month after delivery, so follow-up information was not recorded. Both mothers lived as single mothers; one reported that this was not a planned pregnancy.

3.3.1.5 *Support Available to the Mother from the Partner*

The support available to mothers from their partners was examined by asking the mother about emotional and instrumental support received, as well as the ability to confide in and rely on partners, family and friends when help is needed. In our sample, 97.1% of mothers reported having adequate emotional support and 95.6% instrumental from their partner. The majority (98.5%) of the mothers reported that they are able to rely on the help of their partner and 100% that they can confide in their partner (Table 4).

3.3.1.6 *Support Available to the Mother from the Family*

The support system provided by the family was also examined and (95.8%) mothers felt that they had adequate emotional support from the family; 87.3% indicated that they also had instrumental support from the family. The majority of mothers (95.8%) reported being able to rely upon the family when they needed help, and 83.7% reported being able to confide in family members (Table 4).

3.3.1.7 *Support Available to the Mother from Friends*

A majority of the mothers reported having adequate emotional support from friends (95.8%) and adequate instrumental support from friends (80.3%), as shown in Table 4.

Table 4: Antenatal Risk Factors Related to Marital and Support Variables

Variable	Yes		No	
Marital Satisfaction	**N**	**%**	**N**	**%**
Are you satisfied with your marriage? *	66	97.1	2	2.9
Are things going well between you and your partner? *	67	98.5	1	1.5
Are you currently experiencing any marital problems? *	68	100		
Do you have any previous unresolved relationship issues?	2	2.8	69	97.2
Partner Support				
Do you feel you receive adequate emotional support from your partner? *	66	97.1	2	2.9
Do you feel you receive adequate instrumental support from your partner? *	65	95.6	3	4.4
Do you feel that you can rely on your partner when you need help? *	67	98.5	1	1.5
Do you feel you can confide in your partner? *	68	100		

*Note : Data not available for single mothers

Table 4: Antenatal Risk Factors Related to Marital and Support Variables cont.

Family Support	**Yes**		**No**	
Variable	**N**	**%**	**N**	**%**
Do you feel that you receive adequate emotional support from your family?	68	95.8	3	4.2
Do you feel you receive adequate instrumental support from your family?	62	87.3	9	12.7
Do you feel that you can rely on your family when you need help?	68	95.8	3	4.2
Do you feel that you can confide in your family?	62	87.3	9	12.7
Friend Support				
Variable	**N**	**%**	**N**	**%**
Do you feel that you receive adequate instrumental support from your friends?	57	80.3	14	19.7
Do you feel that you receive adequate emotional support from your friends?	68	95.8	3	4.2
Do you feel that you can rely on your friends when you need help?	68	95.8	3	4.2
Do you feel that you can confide in your friends?	66	93.0	5	7.0

3.3.1.8 *Variables Related to Life Stress*

Stressful life events such as family crisis, bereavement, change of house, unsuitable housing, financial problems, caring for three or more children, and no outside employment, can all cause depression in women, especially if they lack social and emotional support (Brown & Harris, 1978). This study asked mothers in the initial interview if they considered any of these stress events or situations to be present in their life at the time of the interview. Close to 13 % (12.7%) of mothers reported they were experiencing financial problems, 8.5% had experienced a recent death in family, 15.5% were experiencing serious illness in the family (extended family members), 12.7% had recently moved; and 12.7% noted a job change (Table 5).

Table 5: Antenatal Life Stress Risk Factors

Life Stresses Encountered				
Variable	Yes		No	
Are you...?	N	%	N	%
Currently experiencing financial problems?	9	12.7	62	87.3
Currently experiencing marital problems?	-	-	71	100.0
Currently experiencing death in the family?	6	8.5	65	91.5
Currently experiencing a serious illness?	11	15.5	60	84.5
Currently experiencing moving?	9	12.7	62	87.3
Currently experiencing unemployment?	3	4.2	68	95.8
Currently experiencing job change?	9	12.7	62	87.3

3.3.2 Risk Factors Related to Postpartum Period

3.3.2.1 *Experience of Postpartum Blues*

The postpartum blues is another very common risk factor for the development of postpartum depression. This study asked mothers at one month postpartum if they experienced postpartum blues. Among the mothers who returned the one-month questionnaire, 50.7 % reported having postpartum blues in the first week after delivery (Table 6).

3.3.2.2 *Variables Related to Childcare Stress*

Childcare stress is defined as the difficulty a mother experiences while caring for an infant (Beck, 1998). Possible causes are feeding problems, difficulties with consoling the baby, difficulties with sleeping as well as health problems in the infant. Table 6 presents the status of childcare stress in the mothers at one month and three months follow-up. We also asked if mothers were breastfeeding at one month and three months.

More mothers had difficulties with consoling their infants during the first month of their life, which most likely reflects the period during which the mother tries to perceive the infant's needs and gain confidence in her role as mother. This adjustment is defined in previous literature as the development of the mother-infant dyad. The temperament of some infants, including that of being fussy, irritable, difficult to console, and unpredictable, can add to childcare stress (Beck, 1998).

Another component of childcare stress is related to feeding difficulties and, in this study sample, more mothers had difficulties with feeding their infants in the first month than at three months. Among the eight mothers who had problems feeding their infant at one month, seven did not report problems at three months, and one did not return the questionnaire at three months. Two mothers reported problems at three months for the first time.

More babies in our sample had health problems at three months (8.5 %), than at one-month (2.8%). Six out of 10 mothers who reported health problems in their infants at three months also had had problems at one month.

The infant sleeping pattern development is part of the adaptation to extrauterine life and as such it is not uncommon for more babies to have sleeping problems at one month than at three months postpartum, when some pattern has been established. Four out of 16 who had infant sleeping problems at one month continue to report them at three months, one of the mothers who reported problems at one month did not return the three months questionnaire. Two mothers reported similar problems for the first time at three months (Table 6).

Previous studies are divided about the contribution of breastfeeding practices to maternal stress (Stowe & Nemeroff, 1995), but this study recognized it as additional challenge in caring for an infant, particularly in primiparas during the first couple of months of infant life. In this sample, more mothers had breastfed at one month (67%) than at three months (50 %) as shown in Table 6.

Table 6: Risk Factors Examined in the Postpartum Period

Variable	Yes		No	
	N	%	N	%
Experience of Postpartum Blues				
Have you experienced of tearfulness and mood swings during the first week after delivery?				
Yes	33	50.7	32	49.3
Childcare Stress				
Would you consider your baby difficult to console?				
One month follow-up	6	9.4	58	90.6
Three months follow-up	1	1.6	61	98.4
Are you having problems feeding your baby?				
One month follow-up	8	12.5	56	87.5
Three months follow-up	2	3.2	60	96.8
Is your infant experiencing any health problems?				
One month follow up	2	3.1	62	96.9
Three months follow up	6	9.7	56	90.3
Are you having problems with your baby's sleeping?				
One month follow-up	16	25.0	48	75.0
Three months follow-up	6	9.7	56	90.3
Breastfeeding				
Are you breastfeeding your baby?				
One month follow-up	43	67.2	21	32.8
Three months follow-up	31	50.0	31	50.0

3.4 Prevalence of Postpartum Depression in the Sample

Every time a questionnaire was sent, the mother was also asked if she had been formally diagnosed with depression at that time and if she received treatment for it. This was done in order not to miss any mother who might be diagnosed as depressed who did not score above the threshold on the EPDS questionnaire. In this study, the threshold score for the EPDS questionnaire was set above 12. All mothers scoring above 12 were defined as possibly suffering from "depression." This group received an additional questionnaire in

two weeks to follow up and confirm the score level. Results are presented in Tables 7, 7.1 and 7.2.

Mothers scoring from 9-12 were defined as "at risk of developing depression." Even though not defined as depressed, there is concern that these mothers might eventually suffer from depression. All mothers scoring above 9 were advised to contact a GP or health care nurse for further evaluation. A point prevalence of postpartum depression at one month after delivery was 3.07%, the point prevalence of postpartum depression at three months after delivery was 3.2%, the period prevalence rate at three month after delivery was 4.8%; and the incidence rate at three months after delivery was 1.6%.

The two mothers who scored above 12 on the EPDS at one month represent mothers who likely experienced depression. Both mothers also reported that they were diagnosed and treated for depression. The additional questionnaire sent two weeks from the original confirmed for one mother the original score of above 12 on the EPDS; however, for the other mother, the second questionnaire score was lower, at 8 on the EPDS. The reason why the EPDS questionnaire repeated in two weeks did not confirm the first score could be that the second score indicated a response to active anti-depressive treatment, or it could be an error associated with a repeated measuring effect of the scale.

Table 7 : EPDS Scoring in the Sample at One Month

EPDS score	N	%
<9	51	80.0
9-12	11	16.9
>12	2	3.1
Total	64+1*	100

Table 7.1: EPDS Scoring in the Sample at Three Months

EPDS score	N	%
<9	56	90.3
9-12	4	6.5
>12	2	3.2
Total	62	100

Table 7.2: EPDS Scores, For Selected Groups at 1 and 3 Months Post Delivery

EPDS score at one month	EPDS score at three months			Total
	< 9	9-12	>12	
<9	47+1*	2	1	50+1*
9-12	7	2		9
>12	1		1	2
Total	56	4	2	62

* EPDS score not available at one month

3.4.1 Comparison of Three Major Scoring Groups

3.4.1.1 *Demographic Characteristics:*

(a) Mothers Scoring "Normal "at One and Three Months. There were 48 mothers scoring below nine at one and three months (See Table 8). For one mother in this group, we did not receive the first survey at one month. Later, in a follow-up PDPI questionnaire, the mother reported having no depression after delivery; this mother was included in the normal scoring group. The mothers' mean age was 30.48, median age was

31. Most of the mothers in this group were married (79.2%) or were in common law relationships (18.8%); employed (52.1% full time, 22.9% part time); living with partners who were employed full time; and owned their home (81.3%).

(b) Mothers Scoring "At Risk" at One and Three Months. Only two mothers scored between 9-12 (At Risk) on the EPDS questionnaire at one and three months. One mother was 25, the other 31 years old. They were both married; one was employed full time and one was a housewife. Both of the mothers' partners were employed full time; one had her own house, while the other was renting.

(c) Mothers Defined as "Likely" to Experience Depression at One and Three Months. The mothers who scored above 12 at one and three months were defined as likely to experience depression. Only one mother scored in this category. The mother was 31 years of age, married, employed part time. Her partner was employed full time and they owned a house.

3.4.1.2 *Clinical Characteristics*:

(a) Mothers Scoring "Normal "at One and Three Months. Close to 41.7% of mothers were primipare and 13.5% of the multipare women had more than two children at home; duration of pregnancy at delivery ranged from 36 to 42 weeks.

(b) Mothers Scoring "At Risk" at One and Three Months. Both mothers were multiparae, mean duration of pregnancy was 38 weeks, age of children at home was 2 years for one mother and 3 years for the second mother.

(c) Mothers Defined as "Likely" to Experience Depression at One and Three Months. This was their second child, and the baby was delivered at 40 weeks of gestation.

3.4.1.3 *Psychiatric Variables:*

(a) Mothers Scoring "Normal "at One and Three Months In this group, 6.3% mothers reported having felt depressed, and 16.7% felt anxiety during the current pregnancy; 10.4% of mothers reported a previous personal history of depression which lasted from two to 24 months, and 8.3% received physician assistance for their condition in the past. Close to thirty percent (29.2 %) reported having someone related who was diagnosed with a psychiatric condition (Table 9).

(b) Mothers Scoring "At Risk" at One and Three Months Neither mother was depressed during the pregnancy. One had anxiety symptoms during the pregnancy and a positive family history of psychiatric conditions. The other mother had a previous history of depression, for which she required psychiatric care, and had experienced mood swings in the first week after the recent delivery.

(c) Mothers Defined as "Likely" to Experience Depression at One and Three Months. This mother indicated that she had a previous history of depression for which she received medication and psychiatric care. She also reported having symptoms of depression and anxiety during the pregnancy, and experienced maternity blues after delivery. At one month after delivery she scored 22 on EDPS questionnaire and at three months she scored 13 on the EPDS. She was under psychiatric care and was undergoing treatment for depression during the three months of our study. The mother also reported a positive history of psychiatric conditions in close relatives.

3.4.1.4 *Support System Variables:*

(a) Mothers Scoring "Normal "at One and Three Months In this group 97.9% of mothers said that they had emotional support from their partners, 100% had support from their family and 93.8% had support from their friends. Regarding instrumental support at home, 95.8% had support from the partners, 89.6% from the family and 81.3% from their friends. When asked if they are able to rely on their partner, 97.9% of mothers said yes. The same percentage said that they can rely on family members, and 95.8% said they could rely on their friends. All mothers in this group said that they are able to confide in their partners, 89.6% were able to confide in their family and 93.8% were able to confide in their friends (see Table 10).

(b) Mothers Scoring "At Risk" at One and Three Months Both mothers have emotional and instrumental support from their partners, family and friends. Both mothers stated that they also have instrumental support from their partner and family, but one mother stated that she has no instrumental support from her friends. Both mothers can confide in and rely on their partners, but one mother stated that she could not confide in her family. Both mothers stated that they could rely on partner, family and friends when they needed help.

(c) Mothers Defined as "Likely" to Experience Depression at One and Three Months The mother reported that she receives emotional and instrumental support from her partner, family and friends. She can also rely on and confide in her partner, family and friends when she needs help.

3.4.1.5 *Marital Satisfaction:*

(a) Mothers Scoring "Normal "at One and Three Months Reported marital satisfaction was high in this group; 97.9% responded that they were satisfied and 100% said that they had not experienced any marital problems at that time (see Table 11).

(b) Mothers Scoring "At Risk" at One and Three Months Both mothers were satisfied with their marital relationships.

(c) Mothers Defined as "Likely" to Experience Depression at One and Three Months The mother stated she is satisfied with her marital relationship.

3.4.1.6 *Major Life Stress Factors:*

(a) Mothers Scoring "Normal "at One and Three Months The major life stresses reported by this group of mothers included: financial problems (2.1%); a recent death in the family (6.3%); serious illness in the family (14.6%). Close to 13 percent (12.6%) of mothers said that they would be moving, 4.2 % were unemployed and 10.4% indicated they would change jobs in the near future (see Table 12).

(b) Mothers Scoring "At Risk" at One and Three Months Both mothers reported experiencing financial problems, one experienced a death in the family, and one experienced a serious illness in the family.

(c) Mothers Defined as "Likely" to Experience Depression at One and Three Months This mother did not report having any major stress events such as financial or marital problems, death or serious illness in the family, unemployment, job change, or moving.

Table 8: Demographic Characteristics of Three Major Scoring Groups

Variable	EPDS >9 at one & three months		EPDS 9-12 at one & three months		EPDS >12 at one & three months	
Mother Age (years) mean; min.-max; S.D.	30.48; 19-40; 4.44		28; 25-31; 4.24		31	
Variable	N	%	N	%	N	%
Marital Status						
Married	38	79.2	2	100	1	100
Common Law Relationship	9	18.8				
Single	1	2.0				
Total	48	100				
Employment Status of Mother						
Full time	25	52.1	1	50		
Part time	11	22.9	1	50	1	100
Housewife	11	22.9				
Student	1	2.1				
Total	48	100				
Employment Status of the Partner						
Full time	39	81.3	2	100	1	100
Part time	3	6.2				
Unemployed	3	6.2				
Student	3	6.2				
Total	48	100				
Place for child in family						
First	20	41.7				
Second	22	45.8	2	100	1	100
Third	5	10.4				
Fourth	1	2.1				
Total	48	100				
Gestational week at delivery (mean, min.-max. S.D.)	39.85; 36- 42; 1.33		39.5; 36-41; 2.12		40	

Table 9: Psychiatric Variables of Three Major Scoring Groups

Variable	EPDS <9		EPDS 9-12		EPDS >12	
	N	%	N	%	N	%
Have you felt depressed during your pregnancy?						
Yes	3	6.3	0		1	100
No	45	93.8	0		0	
Mean duration in month, min.-max. Number of mothers (Duration in months) Number of mothers (Severity; mild=1, moderate=2, severe=3)	1(1) 3(1) 2(1), 1(2)				9(9) 1(9) 1(1)	100
Have you been feeling anxious during your pregnancy?						
Yes	8	16.7	1	50	1	100
No	40	83.3	1	50		
Mean duration in months, min.-max. Number of mothers (Duration in months)	5.4 (1-9) 3(1),1(4), 4(9)		1(1) 1(1)		1(1) 1(1)	
Before this pregnancy, have you ever been depressed?						
Variable	N	%	N	%	N	%
Yes	5	10.4	1	50	1	100
No	43	89.6	1	50		
Received physician's care(yes=1,no=0)	4	8.3	1	100	1	
Mean duration in months (min.-max.) Number of mothers (Duration in months)	11.5 (2-24) 2(2); 1(18); 1(24), 1(NA)		1(1) 1(1)		1(1) 1(4)	
Has any close relative had a course of psychiatric treatment as in/out patient?						
Yes	14	29.2	1	50	1	100
No	34	70.8	1	50		
Total	48	100	2	100	1	100

Table 10: Support Variables for Three Major Scoring Groups

Variable		EPDS <9*		EPDS 9-12		EPDS >12	
Do you receive adequate emotional support?		N	%	N	%	N	%
From your partner*	Yes	31	64.6	2	100	1	100
	No	16	33.3				
From your family	Yes	48	100	2	100	1	100
	No						
From your friends	Yes	45	93.8	2	100	1	100
	No	3	6.2				
Do you receive adequate instrumental support?							
From your partner*	Yes	31	64.6	2	100	1	100
	No	16	33.3				
From your family	Yes	43	89.6	2	100	1	100
	No	5	10.4				
From your friends	Yes	39	81.3	1	50	1	100
	No	9	18.7	1	50		
Are you able to relay to------- when you need help?							
Your partner*	Yes	46	97.9	2	100	1	100
	No	1	2.1				
Your family	Yes	47	97.9	2	100	1	100
	No	1	2.1				
Your friends	Yes	46	95.8	2	100	1	100
	No	2	4.2				
Do you feel you can confide to--------?							
Your partner*	Yes	47	100	2	100	1	100
	No						
Your family	Yes	43	89.6	1	50	1	100
	No	5	10.4	1	50		
Your friends	Yes	45	93.8	2	100	1	100
	No	3	6.3				

*Data not available for single mothers.

Table 11: Marital Satisfaction of Three Major Scoring Groups

Variable		EPDS <9		EPDS 9-12		EPDS >12	
Are you...?		N	%	N	%	N	%
Are you satisfied with your marriage? *	Yes	46	97.9	2	100	1	100
	No	1	2.1				
Are things going well between you and your partner? *	Yes	46	97.9	2	100	1	100
	No	1	2.1				
Are you currently experiencing any marital problems?*	Yes						
	No	47	100	2	100	1	100
Do you have any previous unresolved relationship issues?	Yes						
	No	48	100	2	100	1	100

*Data not available for single mothers.

Table 12: Life Stress Encountered in Three Major Scoring Groups

Variable		EPDS <9		EPDS 9-12		EPDS >12	
Are you...?		N	%	N	%	N	%
Currently experiencing financial problems?	Yes	1	2.1				
	No	47	97.9	2	100	1	100
Currently experiencing death in the family?	Yes	3	6.2	1	50		
	No	45	93.8	1	50	1	100
Currently experiencing a serious illness?	Yes	7	14.6	1	50		
	No	41	85.4	1	50	1	100
Currently experiencing moving?	Yes	6	12.5				
	No	42	87.5	2	100	1	100
Currently experiencing unemployment?	Yes	2	4.2				
	No	46	95.8	2	100	1	100
Currently experiencing job change?	Yes	5	10.4				
	No	43	89.6	2	100	1	100

3.4.2 Variables Related to Postpartum Period

During the postpartum follow up in addition to the EPDS questionnaire, the mothers were asked additional questions related to childcare stress, an experience of mood swings and any care that might have occurred during the examined period relating to postpartum

depression. Here are presented results of these factors for three major scoring groups during postpartum period.

3.4.2.1 *Experience of Postpartum Blues*

In the group of mothers that scored at normal range 37.5% mothers experienced postpartum blues, in the group of at risk one mother had experienced and other did not experienced postpartum blues. Mother who scored above 12 did experienced postpartum blues.

3.4.2.2 *Childcare Stress Variables*

(a) Mothers Scoring "Normal "at One and Three Months In the group of mothers scoring normal at both one and three months, only 10.4% of infants were difficult to console at one month and that percentage decreased at three months to 2.1%. Ten-percent (10.4) of mothers reported that they had problems with feeding their baby at one month, and at three months only 2.1% of them continued to have similar problems. Other childcare stress variables examined in this group were health problems and sleeping problems of the infant. At one month, 4.2% reported their infant was experiencing health problems, and at three months that percentage increased to 12.5%. Four of six mothers who reported health problems at three months had not reported these problems at one month. At one month, 20.8% of mothers in this group reported that their baby had

difficulties with sleeping and at three months only 6.3 % reported similar problems (Table 13). Missing data belongs to a mother whose questionnaire got misplaced in the mail.

Close to two thirds (64.6%) of mothers in this group were breastfeeding at one month and 50% were breastfeeding at three months; 16.7% of mothers gave up breastfeeding during the first three months of the infant's life (Table 13).

(b) Mothers Scoring "At Risk" at One and Three Months This was the second child for both mothers. Both infants had difficulty feeding at one month, which was resolved at three months. The mothers did not report difficulty with consoling the infant and there were no health problems with either child; one child had difficulty sleeping at one month, which resolved later at three months.

(c) Mothers Defined as "Likely" to Experience Depression at One and Three Months The mother did not report having problems consoling her child or with feeding at one and three months and the infant did not have any health problems. The mother did report that the baby was having difficulty with sleeping at three months. .

Table 13: Variables Related to Postpartum Period (Childcare Stress and Postpartum Blues) in Three Major Scoring Groups

Variable		EPDS <9		EPDS 9-12		EPDS >12	
		N	%	N	%	N	%
Would you consider your baby difficult to console?							
At 1 month	Yes	5	10.4				
	No	42	87.5	2	100	1	100
	Missing	1	2.1				
At 3 months	Yes	1	2.1			1	100
	No	47	97.9	2	100		
Are you having problems feeding your baby?							
At 1 month	Yes	5	10.4	2	100		
	No	42	87.5			1	100
	Missing	1	2.1				
At 3 months	Yes	1	2.1			1	100
	No	47	97.9	2	100		
Is your infant experiencing any health problems?							
At 1 month	Yes	2	4.3				
	No	45	93.7	2	100	1	100
	Missing	1	2.1				
At 3 months	Yes	6	12.5			1	100
	No	42	87.5	2	100		
Are you having problems with your baby sleeping?							
At 1 month	Yes	10	20.8	1	50		
	No	37	77.1	1	50	1	100
	Missing	1	2.1				
At 3 months	Yes	3	6.3			1	100
	No	45	93.7	2	100		
Total		48	100	2	100	1	100
Are you breastfeeding your baby?							
At 1 month	Yes	31	64.6	1	50		
	No	16	33.3	1	50	1	100
	Missing	1	2.1				
At 3 months	Yes	24	50.0	1	50	1	100
	No	24	50.0	1	50	1	100
Have you experienced mood swings after your childbirth?							
	Yes	18	37.5	1	50	1	100
	No	30	62.5	1	50		

3.4.3 Combination Within the Main Scoring Groups at One and Three Months

Some mothers changed between major scoring groups during the observation period of one and three months postpartum. Below are comments on basic demographic characteristics of these groups and on the risk factors related to the groups.

3.4.3.1 *Mothers Scoring 9-12 at One Month, and Under 9 at Three Months*

Seven mothers scored 9-12 at one month on the EPDS, which is defined in most literature as at risk of developing depression, but scored normal (below 9) at three months. Mothers' ages ranged from 27 to 36 years. Six mothers were married and one was in a common-law relationship. Four mothers were employed full-time, three part-time and one was a housewife; their partners were all employed full-time. All but one mother owned her own home; one was renting. During the most recent pregnancy, two mothers (28.6%) reported having symptoms of mild depression, which lasted up to three months. Five (71.4%) mothers experienced symptoms of anxiety and all mothers in this group had experienced postpartum blues. One mother also had a positive family history of mental conditions requiring psychiatric treatment.

For three of the mothers this was the first baby; four had two or more children at home. Gestation age at delivery for this group was between 39-41 weeks.

In this group, no mother reported having health problems, difficulty consoling the infant or problems with feeding their infants. At one month, 42.9%, and at three months, 14.3% did report having problems with their infant's sleeping pattern. Most of the mothers (85.7%) in the group breastfed their infants at one month and 57.1% continued at three months.

All mothers in this group reported having adequate emotional and instrumental support from their partners. These mothers did not report having marital problems and were able to confide in and rely on their partners when they needed help.

Most of the mothers reported receiving support (85.7%) from and could rely (85.7%) on their families. Furthermore, all mothers reported that they could confide in their family. All mothers in this group had emotional support from their friends, and 71% also had instrumental support, 85.7% reported they could rely on and confide in their friends.

Regarding major stresses, 42.9% reported having financial problems, one mother had had a death in her family and two mothers (28.6%) had a job change. There were no other major stress factors reported in this group.

3.4.3.2 *Mothers Scoring Under 9 at One Month and 9-12 at Three Months*

There were two mothers whose score changed from normal (<9) at one month of observation to being at risk of developing depression (9-12) at three months of observation. The mothers were 30 and 24 years old and both were married; one was employed full time and the other was a housewife. This was a first pregnancy for both mothers and the gestation age at delivery was 40 weeks. One mother owned her own house, while the other was renting. The change in their EPDS score was from seven and eight at one month to 10 each at three months.

Regarding risk factors associated with depression, we found that only one mother experienced mood swings after delivery; during pregnancy neither experienced symptoms of depression, but one mother had symptoms of anxiety. One mother had a history of depression prior to pregnancy and was seen by a psychiatrist for counseling, but has not received medication. One mother also has a positive family history of mental conditions.

The mothers did not report having marital problems. They received adequate emotional and instrumental support from their partners and could confide in and rely on them when they needed help. One mother reported not having adequate emotional and instrumental support from the family; she also stated she could not rely on or confide in family

members. Both mothers had emotional and instrumental support, and could rely on and confide in their friends.

With respect to childcare stress risk factors, both mothers breastfed their infants at one month; only one was breastfeeding at three months. During the three months of the study they did not report problems with feeding or with the health of their infants. Furthermore, the mothers did not report any other stress factors such as serious illness in the family, death, financial problems, moving or unemployment.

3.4.3.3 *Mothers Scoring Under 9 at One Month and Above 12 at Three Months*

One mother scored below nine at one month and above 12 at three months. She was 27 years old, married and this was her second child. She and her partner were employed full time and they owned their home.

This mother experienced mood swings after delivery, but did not have symptoms of depression or anxiety during the recent pregnancy. She had not been depressed at any time in her life, and has no family history of mental problems. This mother reported that she was satisfied with her marriage, was receiving adequate emotional and instrumental support and could rely on and confide in her partner. She also received adequate support from her family and her friends.

This mother breastfed her baby at one and three months. At three months, she reported having problems with feeding her infant. There were no health or sleeping problems of the infant and mother had no difficulty consoling her baby at one and three months.

There were no other major stresses present. This mother had not received psychiatric care or counseling during the study period. The mother's EPDS score changed from six at one month to 13 at three months. She was informed of her EPDS score result and advised to contact a health professional for assessment.

3.4.3.4 *Mothers Scoring Above 12 at One Month, and Under 9 at Three Months*

Only one mother scored in this group. She was 28 years old, married and having her first child. She was a housewife, whose partner was employed full time and they owned their home. The mother reported postpartum blues after delivery. She experienced symptoms of mild depression during the pregnancy, but no anxiety. Before this pregnancy, she suffered a depressive episode, lasting 12 months, for which she received care and medical treatment from a physician. No family history of mental conditions was reported, however, she did report a serious illness in the family.

The mother was not breastfeeding at one or three months. Her infant did not have any problems with health, feeding or sleeping, and was not difficult to console.

This mother reported that she received emotional and instrumental support from her partner and family. She reported that she could rely on her partner and family as well as confide in them. She reported having emotional support from her friends, but she was not able to confide in them and received no instrumental help from them.

She was under physician care for ongoing depression and received anti-depressive therapy at one and three months. She also received counseling at one month and her score on the EPDS changed from 23 at one month to three at three months, which probably reflects a positive response to anti-depressive treatment and counseling. At three months she was on a decreased dose of the same anti-depressive treatment.

3.5 The Association Between the Examined Risk Factors and the Score Level at One and Three Months for the Whole Sample

In this study, the most commonly reported risk factors were examined. The following tables present the findings with respect to the association between the examined risk factors and the scores on the EPDS during the three months observation period.

3.5.1 Variables Related to Antenatal Period

3.5.1.1 *Personal History of Depression, Anxiety and Family History of Mental Conditions*

The Mann Whitney–U testing was used to examine the relationship between (a) the EPDS score at one and three months and (b) a personal history of depression. All mothers who scored above 12 on the EPDS at one month follow-up had a previous history of depression, with $p=0.014$ for one month and $p=0.019$ at three months postpartum. Depression or depressive symptoms during the pregnancy (self-reported) were significantly related to EPDS scores at one month with $p<0.001$ on the Mann Whitney- U Test (Table 14). A majority of the mothers who scored <9 on the EPDS or "normal" at one month (94.1%) and at three months (89.3%) did not feel depressed during the

pregnancy. Both mothers who scored above 12 on the EPDS at one month did feel depressed during pregnancy.

Table 14: Variables Related to Pre-Pregnancy and Recent Pregnancy Depression by the EPDS Scores

Variable		< 9 n (%)	9 to 12 n (%)	>12 n (%)	N (%)	p
Before this pregnancy, have you ever been depressed?						
One month, n (%)	Yes	6 (54.5)	3 (27.3)	2 (18.2)	11 (17.2)	.014
	No	45 (84.9)	8 (15.1)	-	53 (82.8)	
Three months, n (%)	Yes	7 (70.0)	2 (20.0)	1 (10.0)	10 (16.1)	.019
	No	49 (94.2)	2 (3.8)	1 (1.9)	52 (83.9)	
Have you felt depressed during your pregnancy?						
One month* n (%)	Yes	3 (42.8)	2 (28.6)	2 (28.6)	7 (10.9)	<.001
	No	48 (84.2)	9 (15.8)	-	57 (89.1)	
Three months n (%)	Yes	6 (85.7)	-	1 (14.3)	7 (11.3)	n.s.
	No	50 (90.9)	4 (7.3)	1 (1.8)	55 (88.7)	

*One EPDS score not available at one month.

The association between (self-reports) anxiety and the EPDS scores at one and three months were compared and it was found that reports of anxiety symptoms during pregnancy were significantly related to the EPDS score at one month but not at 3 months postpartum. Over 72.7% of mothers scoring "at risk" (9-12 on the EPDS) reported anxiety during the recent pregnancy, and 50% of mothers who scored above 12 at one month had similar symptoms. Over 82.4 % scoring "normal" (less than 9) at one months did not have anxiety during pregnancy. At three months that significant association was not observed, as shown below in Table 15.

Table 15: Antenatal Anxiety by EPDS Scores

Variable		< 9 n (%)	9 to 12 n (%)	>12 n (%)	N(%)	p
Have you been feeling anxious during your pregnancy?						
One month*	Yes	9 (50.0)	8(44.4)	1(5.6)	18 (28.1)	<.001
	No	42(91.3)	3(6.5)	1(2.2)	46(71.9)	
Three months	Yes	13(81.2)	2(12.5)	1(6.3)	16(25.8)	n.s.
	No	43(93.5)	2(4.3)	1(2.2)	46(74.2)	

*One EPDS score not available at one month.

The Mann Whitney- U test was used to examine the relationship between (a) the EPDS score at one and three months and (b) a previously reported family history of mental illnesses. The p values were not at significant levels either at one or three months $p>0.05$ (Table 16).

Table 16: Family History of Mental Illness by EPDS Scores

Variable		< 9 n (%)	9 to 12 n (%)	>12 n (%)	N(%)	p
Has any close relative had a course of psychiatric treatment?						
One month*	Yes	15(75.0)	4(20.0)	1(5.0)	20(31.3)	n.s.
	No	36(81.8)	7(15.9)	1(2.3)	44(68.8)	
Three months	Yes	15(83.3)	2(11.1)	1(5.6)	18(29.0)	n.s.
	No	41(93.2)	2(4.5)	1(2.3)	44(71.0)	

*One EPDS score not available at one month.

3.5.1.2 *Marital Satisfaction*

Marital satisfaction, marital problems, and relationship with a partner were not found to be significantly associated with EPDS scores either at one or three month observation (Table 17).

Table 17: Variables Related to Marital Satisfaction by EPDS Scores*

Variable		< 9 n (%)	9 to 12 n (%)	>12 n (%)	N(%)	p
Are you satisfied with your marriage?						
One month	Yes	49(80.3)	10(16.4)	2(3.3)	61(96.8)	n.s
	No	1(50.0)	1(50.0)	-	2(3.2)	
Three months	Yes	54(90.0)	4(6.7)	2(3.3)	60(98.4)	n.s
	No	1(100)	-	-	1(1.6)	
Are you currently experiencing any marital problems?						
One month	Yes	-	-	-	-	
	No	50(79.4)	11(17.4)	2(3.2)	63(100)	
Three months	Yes					
	No	55(90.2)	4(6.5)	2(3.3)	61(100)	
Are things going well between you and your partner?						
One month	Yes	49(79.0)	11(17.7)	2 (3.3)	62(98.4)	n.s
	No	1(100)	-	-	1(1.6)	
Three months	Yes	54(90.0)	4(6.7)	2(3.3)	60(98.4)	n.s
	No	1(100)	-	-	1(1.6)	

Note: * Data not available for single mother;

3.5.1.3 *Support From the Partner*

Researchers have suggested that lack of spousal support may be an important factor in the development of PPD (Gotlib et al., 1991). Furthermore, some research suggests that a supportive marital relationship may serve as a buffer against depression related to stressors such as birth of child (Paykel et al., 1980). In this study however, support received from a partner (emotional and instrumental), the ability to rely on a partner when help is needed, as well as the ability to confide in a partner was not found to be significantly associated with EPDS scores at the one or three months observation period.

Due to small numbers, the Mann Whitney test was performed where mothers with EPDS score below 9 were compared for all who scored 9 and above (Table 18).

Table 18: Variables Related to Partner Support by EPDS Scores*

Variable		< 9 n(%)	9 to 12 n(%)	>12 n(%)	N(%)	p
Do you feel you receive adequate emotional support from your partner?						
One month	Yes	49(79.0)	11(17.7)	2(3.2)	62(98.4)	n.s
	No	1(100)	-	-	1(1.6)	
Three months	Yes	54(90.0)	4(6.7)	2(3.3)	60(98.4)	n.s
	No	1(100)	-	-	1(1.6)	
Do you feel you receive adequate instrumental support from your partner?						
One month	Yes	47(78.3)	11(18.3)	2(3.3)	60(95.2)	n.s
	No	3(100)	-	-	3(4.8)	
Three months	Yes	53(89.9)	4(6.7)	2(3.4)	59(96.7)	n.s
	No	2(100)	-	-	2(3.3)	
Do you feel that you can rely on your partner when you need help?						
One month	Yes	49(79.0)	11(17.7)	2(3.3)	62(98.4)	n.s
	No	1(100)	-	-	1(1.6)	
Three months	Yes	54(90.0)	4(6.7)	2(3.3)	60(98.4)	n.s
	No	1(100)	-	-	1(1.6)	
Do you feel you can confide in your partner?						
One month	Yes	50(79.4)	11(17.4)	2(3.2)	63(100)	
	No	-	-	-	-	
Three months	Yes	55(90.3)	4(6.5)	2(3.2)	61(100)	
	No	-	-	-	-	

Note: * Data not available for single mother.

3.5.1.4 *Support From the Family*

Emotional and instrumental support received from family, such as ability to rely on family when help is needed, as well as the ability to confide in family members was also examined. The Mann Whitney- U test was used to compare emotional support with EPDS scores at one month and at three months and no significant association was indicated.

Instrumental support (i.e., practical help at home) and ability to rely on the family was not significantly associated with EPDS scores at one or three month observation (Table 19). The ability to confide in family members was also not found to be significantly related with to EPDS scores at one and at three months.

Table 19: Variables Related to Family Support by EDPS Scores

Variable		< 9 n (%)	9 to 12 n (%)	> 12 n (%)	N(%)	p
Do you feel you receive adequate emotional support from your family?						
One month	Yes	50(80.6)	10 (16.1)	2(3.2)	62(96.9)	n.s
	No	1 (50.0)	1 (50.0)	-	2 (3.1)	
Three months	Yes	55(91.7)	3 (5.0)	2(3.3)	60(96.8)	.06
	No	1(50.0)	1 (50.0)	-	2 (3.2)	
Do you feel you receive adequate instrumental support from your family?						
One month	Yes	45 (78.9)	10(17.5)	2(3.5)	57(89.1)	n.s.
	No	6 (85.7)	1(14.3)	-	7(10.9)	
Three months	Yes	50 (90.9)	3(5.5)	2(3.6)	55(88.7)	n.s.
	No	6 (85.7)	1(14.3)	-	7(11.3)	
Do you feel that you can rely on your family when you need help?						
One month	Yes	49(80.3)	10(16.4)	2(3.3)	61(95.3)	n.s
	No	2(66.7)	1(33.3)	-	3(4.7)	
Three months	Yes	54(91.5)	3(5.1)	2(3.4)	59(95.2)	n.s
	No	2(66.7)	1(33.3)	-	3(4.8)	
Do you feel you can confide in your family?						
One month	Yes	45(78.9)	10(17.5)	2(3.5)	57(89.1)	n.s.
	No.	6(85.7)	1(14.3)	-	7(10.9)	
Three months	Yes	51(92.7)	2(3.6)	2(3.6)	55(88.7)	.09
	No	5(71.4)	2(28.6)	-	7(11.3)	

3.5.1.5 *Support From Friends*

The factors of emotional and instrumental support, ability to rely on friends when help is needed, and ability to confide in friends were also examined (Table 20). At one and three months, these variables were not found to be significantly associated with EPDS scores.

Table 20: Variables Related to Friend Support by EPDS Scores

Variable		< 9 n (%)	9 to 12 n (%)	>12 n (%)	N (%)	p
Do you feel that you receive adequate emotional support from your friends?						
One month	Yes	48(78.7)	11(18.0)	2(3.3)	61(95.3)	n.s.
	No	3(100)	-	-	3(4.7)	
Three months	Yes	53(89.8)	4(6.8)	2(3.4)	59(95.2)	n.s.
	No	3(100)	-	-	3(4.8)	
Do you feel that you receive adequate instrumental support from your friends?						
One month	Yes	41(82.0)	8(16.0)	1(2.0)	50(78.1)	n.s.
	No	10(71.4)	3(21.4)	1(7.1)	14(21.9)	
Three months	Yes	44(89.8)	3(6.1)	2(4.1)	49(79.0)	n.s
	No	12(92.3)	1(7.7)	-	13(21.0)	
Do you feel that you can rely on your friends when you need help?						
One month	Yes	49(80.3)	10(16.4)	2(3.3)	61(95.3)	n.s
	No	2(66.7)	1(33.3)	-	3(4.7)	
Three months	Yes	53(89.8)	4(6.8)	2(3.4)	59(95.2)	n.s
	No	3(100)	-	-	3(4.8)	
Do you feel you can confide in your friends?						
One month	Yes	48(81.4)	19(16.9)	1(1.7)	59(92.2)	n.s.
	No	3(60.0)	1(20.0)	1(20.0)	5(7.8)	
Three months	Yes	51(89.5)	4(7.0)	2(3.5)	57(91.9)	n.s.
	No	5(100)	-	-	5(8.1)	

3.5.1.6 *Major Life Stress Factors*

Among the stress factors examined in our study, only financial problems were shown to be significantly related with EPDS scores at one with $p<0.001$ but not ($p=0.051$) at three months (Table 21).

Table 21: Variables Related to Life Stress by EPDS Scores

Variable		< 9 n(%)	9 to 12 n(%)	>12 n(%)	N(%)	p
Are you currently experiencing financial problems?						
One month	Yes	1(16.7)	5(83.3)	-	6(9.4)	<.001
	No	50(86.2)	6(10.3)	2(3.5)	58(90.6)	
Three months	Yes	4(66.7)	2(33.3)	-	6(9.7)	.051
	No	52(92.9)	2(3.6)	2(3.6)	56(90.3)	
Do you have any previously unresolved relationship issues?						
One month	Yes	-	-	-	-	
	No	51(79.7)	11(17.2)	2(3.1)	64(100)	
Three months	Yes	-	-	-	-	
	No	56(90.3)	4(6.5)	2(3.2)	62(100)	
Are you currently experiencing a death in the family?						
One month	Yes	3(60.0)	2(40.0)	-	5(7.8)	n.s.
	No	48(81.4)	9(15.2)	2(3.4)	59(92.2)	
Three months	Yes	4(80.0)	1(20.0)	-	5(8.1)	n.s.
	No	52(91.2)	3(5.3)	2(3.5)	57(91.9)	
Are you currently experiencing serious illness?						
One month	Yes	7(77.8)	1(11.1)	1(11.1)	9(14.1)	n.s.
	No	44(80.0)	10(18.2)	1(1.8)	55(85.9)	
Three months	Yes	8(88.9)	1(11.1)	-	9(14.5)	n.s.
	No	48(90.5)	3(5.7)	2(3.8)	53(85.5)	
Are you currently experiencing moving?						
One month	Yes	6(85.7)	1(14.3)	-	7(10.9)	n.s.
	No	45(78.9)	10(17.5)	2(3.5)	57(89.1)	
Three months	Yes	6(100)	-	-	6(9.7)	n.s.
	No	50(89.3)	4(7.1)	2(3.6)	56(90.3)	
Are you currently experiencing unemployment?						
One month	Yes	2(100)	-	-	2(3.1)	n.s
	No	49(79.0)	11(17.7)	2(3.2)	62(96.9)	
Three months	Yes	2(100)	-	-	2(3.2)	n.s
	No	54(90.0)	4(6.7)	2(3.3)	60(96.8)	
Are you currently experiencing job change?						
One month	Yes	5(62.5)	3(37.5)	-	8(12.5)	n.s.
	No	46(82.1)	8(14.3)	2(3.6)	56(87.5)	
Three months	Yes	7(100)	-	-	7(11.3)	n.s.
	No	49(89.1)	4(7.3)	2(3.6)	55(88.7)	

3.5.2 Variables Related to Postpartum Period

3.5.2.1 *Postpartum Blues*

The Mann Whitney-U test suggested a significant relationship between maternity blues (mood swings after delivery) and the EPDS score at one month (p=0.001). A mother, whose one month questionnaire was misplaced in the mail, reported at three months that she had blues postpartum; this report was included in the comparison only at three months. All mothers who scored above 12 on EPDS at one and three months had postpartum blues, and 90.9% of mothers scoring from 9-12 (at risk) at one month reported similar feelings of tearfulness and mood swings after delivery (Table 22).

Table 22: Postpartum Blues by EPDS Scores

Variable		< 9 n(%)	9 to 12 n(%)	>12 n(%)	N(%)	p
Have you experienced tearfulness and mood swings during your first week after delivery?						
One month	Yes	20(62.5)	10(31.3)	2(6.2)	32(50.0) +1*	.001
	No	31(96.9)	1(3.1)	-	32(50.0)	
Three months	Yes	26(86.6)	2(6.7)	2(6.7)	30(48.4)	n.s.
	No	30(93.7)	2(6.3)		32(51.6)	

Note: *EPDS score not available at one month.

3.5.2.2 *Childcare Stress Variables*

Childcare stress variables were assessed on two occasions during postpartum period (one and three months follow up); the report was compared with EPDS scores at the same time point. Of the childcare stress variables examined by the Mann Whitney-U test, difficulties in consoling the infant, as well as the infant's health, were not found to be significantly associated with EPDS scores. Sleeping problems and feeding problems in the infant were significantly associated with EPDS scores at three months postpartum (Table 23).

Table 23: Variables Related to Childcare Stress by EPDS Scores

Variable		< 9 n(%)	9 to 12 n(%)	> 12 n(%)	N(%)	p
Would you consider your baby difficult to console?						
One month	Yes	5(83.3)	1(16.7)	-	6(9.4)	n.s
	No	46(79.3)	10(17.2)	2(3.4)	58(90.6)	
Three months	Yes	1(100)	-	-	1(1.6)	n.s
	No	55(90.2)	4(6.5)	2(3.3)	61(98.4)	
Are you having problems feeding your baby?						
One month	Yes	5(62.5)	3(37.5)	-	8(12.5)	n.s.
	No	46(82.1)	8(14.3)	2(3.6)	56(87.5)	
Three months	Yes	1(50.0)	-	1(50.)	2(3.2)	.036
	No	55(91.7)	4(6.6)	1(1.7)	60(96.8)	
Is your infant experiencing any health problems?						
One month	Yes	2(100.)	-	-	2(3.1)	n.s.
	No	49(79.0)	11(17.7)	2(3.2)	62(96.9)	
Three months	Yes	6(100.)	-	-	6(9.7)	n.s.
	No	50(89.3)	4(7.1)	2(3.6)	56(90.3)	
Are you having problems with your baby sleeping?						
One month	Yes	12(75.0)	4(25.0)	-	16(25.0)	n.s.
	No	39(81.2)	7(14.6)	2(4.2)	48(75.0)	
Three months	Yes	4(66.6)	1(16.7)	1(16.7)	6(9.7)	.037
	No	52(92.8)	3(5.4)	1(1.8)	56(90.3)	
Are you breastfeeding your baby?						
One month	Yes	35(81.4)	8(18.6)	-	43(67.2)	n.s.
	No	16(76.2)	3(14.3)	2(9.5)	21(32.8)	
Three month	Yes	28(90.3)	2(6.5)	1(3.2)	31(50.0)	n.s.
	No	28(90.3)	2(6.5)	1(3.2)	31(50.0)	

3.6 Summary of Findings

Seventy-one of 121 mothers approached agreed to participate in the study yielding a response rate of 58.7%. An 87.3 % return rate at three months postpartum resulted from a drop out rate of 8.5 % at one month and 12.7% at three months.

In summary, the findings of this study on postpartum depression show:

- a prevalence of 3.07% at one month and 3.2% at three months
- a period prevalence rate at three months of 4.8% and
- an incidence rate at three months of 1.6% .

Chi-square analysis and the Mann Whitney-U test were performed to examine the relationship between EPDS scores and risk factors reported in the Beck meta -analysis (Beck, 1996). At one month, association was found (with $p < 0.05$) between increased EPDS scores and these psychiatric variables:

- a previous history of depression;
- depressive symptoms and anxiety observed (self-reported) by the mother during the recent pregnancy;
- maternity blues or mood swings after delivery.

At three months a significant association was not observed for all of these variables except for the history of depression prior to recent pregnancy. Family history of mental problems was not found significantly associated with the EPDS scoring.

Family instrumental support, marital satisfaction, partner and friends instrumental and emotional support were not found to be significantly associated with increased scoring on EPDS either at one month or at three months postpartum. Among the childcare stress variables examined, feeding and sleeping problems were significantly associated with the EPDS scores at three months.

Among the other major life stress factors examined in our study, only financial problems were significantly associated with increased EPDS scores, at one month only.

Among the two mothers scoring above 12 on the EPDS at 1 month (indicating presence of PPD), both reported their feelings to health professionals and received treatment (antidepressant - sertaline in both cases and counseling in one). Only one continued treatment at three months and scored above 12 on the EPDS again. The other scored below 9 (normal) at three months and had discontinued treatment.

CHAPTER 4: DISCUSSION

Following a discussion of (a) characteristics of the sample, (b) epidemiology of postpartum depression in our sample, (c) use of a self -administered questionnaire to detect and (d) contributing factors related to the development of PPD, the limitations of the study will be addressed in the context of the conceptual framework and relevant literature.

4.1 Characteristics of the Sample

4.1.1 Response Rate

This study was designed as a prospective study of prevalence of PPD with a community sample. Seventy-one (71) mothers out of 121 who were approached agreed to participate in the study resulting in a response rate of 58.7%. In other studies the reported response rate varied from 97.3% (Murray & Carothers, 1990; Cooper & Murray, 1995) to dual rates of 54.3% for pregnant subjects and 79.7 % for controls in a study that administered multiple testing in conjunction with urine and blood collection (O'Hara, Zekoski, Phillips & Wright, 1990). Response rate in this study was in the low range compared with other studies using similar recruitment practices.

4.1.2 Drop-out Rate

Most of the reviewed studies of prevalence of PPD used self-administered questionnaires as a tool to identify mothers who developed postpartum depression. The return rate for questionnaires in these studies ranged from 67.3% (Watson et al., 1984) 68% (Gotlib et al., 1991), 85.9% (Augusto, Kumar, Calheiros, Matos & Figueiredo, 1996), to 92% by Murray & Carothers (1990). Strategies used to encourage continuing in a study included multiple reminders over the phone or by letter to mothers (Murray & Carothers, 1990; Cox et al., 1993) or payment reimbursement for completing the questionnaire (Harris et al., 1989).

The return rate in this study was in the upper range (87.3%). A drop out rate of 8.5% (one month, 65 mothers remaining in the sample) and 12.7% at three months (62 mothers remaining in the sample), reflects a total of 9 mothers who discontinued their participation in the study. The range of drop out rates of previous studies which utilized the EPDS questionnaire was from 40% (Roy, Gang, Cole, Rutsky, Reese & Weisbord, 1993) to 3 % (Cox et al., 1993, Holden, 1991). The low drop out rate reported in this study (12.7%) is most likely due to the fact that the EPDS questionnaire was administered in a manner reflecting the experiences of other studies which reported a high response rate, i.e. the use of letter or telephone reminders to prompt mothers to return the questionnaire (Murray & Carothers, 1990 and Cox et al., 1993). The methods of follow up included in this study were telephone calls and re-mailing of letters if the

mother did not respond in one to two weeks after the questionnaire was sent home. Nine mothers who did not return the questionnaires in our study had either (a) changed telephone number or addresses, so the investigator was not able to contact them; (b) did not return the questionnaire after repeated telephone calls or (c) decided not to continue the study at the one-month period (1 mother who had a previous history of depression).

4.1.3 Characteristics of Participants

Earlier studies of PPD have been based on prevalence or case control studies. Prevalence studies have examined culturally and economically homogenous groups of women, limiting generalizability of the findings (Dobie, & Walker, 1992). In this study, the mothers were recruited from the only maternity hospital and obstetric referral site in the community of St. Johns. However, this sample was a homogeneous in its demographic characteristics and was consisted of mothers who were mostly married (77.5%), owned their homes (76.1%), were employed (total 71.8%, 50.7 % full time), with a partner who was also employed (total 91.2%, 83.8% full time), mother's mean age of 30, 58% of whom were multipares and 42% were primipares. Authors of previous studies are divided about the association of social factors, maternal age or parity with vulnerability to depressive symptoms (Dobie & Walker, 1992; Watson et al., 1984; Chaudron et al., 2001; Beck 2001). In this study, a significant association between mother's age, marital status or parity and scoring on the EPDS ($p>0.05$) was not found.

4.1.4 Characteristics of Non-Participants

Demographic characteristics for the group of mothers who refused consent to participate in the study were collected during the study (with mother's agreement). In comparison to those who agreed to participate in the study, the non-participant group had more: (a) single parents (19.1% versus 4.2) and (b) multipares (66.6% versus 57.8). It is possible that both single parents and multipares were more reluctant to participate due to anticipated heavier burdens of childcare or other reasons specific to this group of mothers; however explanation for no-participation in the study was not systematically collected.

4.2 Epidemiology of Postpartum Depression

The incidence rates of reported PPD have ranged from 3-14% (Cutrona, 1983; Gotlib et al., 1989; Kumar & Robson, 1984; O'Hara, Neunaber & Zekoski, 1984) and prevalence rates have ranged from 5.2 - 22% (Richards 1990). Studies that used conventional diagnostic criteria (RDC or DSM) had reported 2-3 month period prevalence rates that range between 8.2 - 14.9 % (Curtona, 1983; Kumar & Robson, 1984). The lowest prevalence rate found (at three months postpartum) was 0.5% using the Montgomery - Ashberg scale reported by Stein et al., (1989). Differences in prevalence in previously reported studies were related to the populations studied, onset and length of follow up and definition of criteria/measurement approaches (Dobie & Walker, 1992).

In this study, prevalence was 3.07% at one month and 3.2% at three months; a period prevalence at three months of 4.8% and an incidence rate at three months of 1.6% . These estimates fall within the range reported by previous studies, but at the lower end of the range.

4.2.1 Population Studied

Indicators such as low income, financial stain, mother's occupation and lower social status have a small but significant predictive relationship to PPD (Robertson et al., 2004). Of all sociodemographic factors that reflect basic facts of a mother's life, the literature lists as major risk factors for PPD: not being married, or in a stable relationship, and low economic status (O'Hara & Swain, 1996; Beck, 2001). The sample in this study consisted primarily of middle class married women (77.5%), with good support (only 4.2 % were not married or cohabitating) and the reported prevalence of PPD was at the low end of the range, at 3.07%.

4.2.2 Length of Follow-up

This study used a follow-period of 3 months, as this is the timeframe in which most mothers report depressive symptoms (Dobie & Walker, 1992). In comparison, although depressive symptoms can occur at any time during the first postpartum year, the length of follow up in previous studies varies from 6 weeks to 4 years (Shaper et al., 1994, Cox et

al., 1993; Kumar & Robson, 1984). It is possible that longer follow up in this study would increase or decrease the prevalence rates reported. However, even a doubling of rates would place findings in the lower end of the estimates previously reported, so it is unlikely this factor was a primary reason for the lower prevalence rates in this study.

4.2.3 Definition Criteria/Measurement Approaches

Tools used previously for detecting depression include a variety of self-administered questionnaires, psychiatric interview or combination of both. Dobie & Walker (1992) suggest that failure to use a standardized structured interview may result in differences of estimated diagnostic rates. The method employed to identify mothers with postpartum depression in this study, the EPDS, was not supplemented with a psychiatric interview. However, an additional questionnaire (PDPI) which was sent along with the EPDS asked the mother at both collection times if she was diagnosed with depression during that period and if any treatment was initiated.

4.3 Factors Related to the Development of Postpartum Depression in the Sample

In this study, the commonly cited social support risk factors were not been found to be significantly associated with PPD, as noted above. A significant relationship was detected between PPD and three categories of variables:

(a) *psychiatric variables* (previous history of depression, depressive symptoms and anxiety in recent pregnancy, postpartum blues),

(b) *life stress factors* (financial difficulties), and

(c) *childcare stress variables* (infant difficulties with sleeping and feeding).

Each is discussed below.

4.3.1 Psychiatric Variables

Personal history of depression, and symptoms of anxiety and depression experienced during pregnancy were related to the EPDS scoring at one month postpartum in this study. It is possible that the onset of symptoms occurred during the pregnancy and continued through the end of pregnancy up to the childbirth. These symptoms may still have persisted in the early postpartum period, which could then account for the high EPDS scoring at one month. Evans and colleagues followed mothers during pregnancy and after childbirth and concluded that symptoms of depression are not more common or severe after childbirth than during pregnancy (Evans, Heron, Francomb, Oke & Golding , 2001).

Postpartum blues were also related to the EPDS scoring at one month in this study. The presence of postpartum blues is associated with subsequent development of PPD, but no hormonal basis to that association has been found (Cooper & Murray, 1998).

4.3.2 Life Stress Factors

The relationship between life events and the onset of depression is well known (Robertson et al., 2004) and occurrence of negative life events is a reliable predictor of PPD (O'Hara & Gorman, 2004). Of the most commonly cited stress factors, this study identified as significant only one life stress (financial problems). As noted previously, the sample in this study reported little experience of the other stress factors which have been reported as associated with PPD in previous studies.

4.3.3 Childcare Stress Variables

Childcare stress including infant health problems and difficulties pertaining to sleeping and feeding problems, have been associated in previous research with a risk for developing depression (Beck, 2001; Hisckok & Wake, 2001). Childcare stress variables such as difficulties in consoling the infant, as well as problems with the infant's health, were not found to be significantly associated with EPDS scores in this study. Sleeping problems and feeding problems in the infant were significantly associated with EPDS scores at three months postpartum only.

4.3.4 Negative Findings for Social Support and Marital Relationship

Support variables positively associated with postpartum depression include high levels of marital conflict and marital dissatisfaction (Gotlib et al., 1991; O'Hara et al., 1991, O'Hara & Swain, 1996; Beck, 2001). In this study however, marital relationship and

satisfaction, as well as practical and emotional support from partner and friends were not related to scoring on the EPDS at one or three months postpartum. Almost all mothers in this study received emotional (97.1%), instrumental (95.6%) support from their partners and reported satisfaction with their marital relationship (97.1%).

Furthermore, this study did not find a significant relationship between lack of ability to confide in partners, family members or friends and increased EPDS scoring. Mothers in this study reported high level of emotional (95.8%) and instrumental (87.3) support from their families, almost all could relay on their family when they need help (95.8%) and 87.3% could confide in their family. Poor quality social support and lack of availability of a confidant for the mother is a factor that has been found to increase morbidity in the puerperium (Richards, 1990).

4.4 Treatment Practices in Dealing with PPD

Cognitive or interpersonal psychotherapy may be considered a first line treatment for women considered at risk for developing psychiatric disorders during pregnancy (Susman, 1996; Jermain, 1995). Interpersonal therapy has been used to treat emotional distress and depression during the postpartum period, with positive effects demonstrated for reducing depressive symptoms (Stuart & O'Hara, 1995). Most clinicians consider selective serotonin reuptake inhibitors to be the first drug choice for treatment of

depression (Jermain, 1995). These agents have a limited adverse effect profile when compared with other antidepressants.

During this study, two mothers were identified by the EPDS as likely to have symptoms of depression at one month and both reported contacting health professionals. The preferred treatment practiced by health care professionals for the mothers who developed postpartum depression in our study was sertraline (Zoloft) combined with counseling, which is consistent with recommendations from the literature.

One mother, who scored above 12 on the EPDS at three months, did not report taking any treatment for depression. She was advised by the researcher to contact a health professional for further assessment. The community health nurses also visited all mothers in our study during the early postpartum period. However, it is possible that the symptoms of depression in this mother did not appear until after the community health nurse visit occurred. This study's finding that one of three women assessed as likely to experience depression did not seek or receive treatment for her condition is consistent with evidence in the literature of low rates of detection (up to 50% undecteted) and treatment of PPD (Cox et al., 1982; Holden, 1991; Mc Cord, 1984; Ramsay, 1993; Posner, Unterman, Williams & Williams,1997)

4.5 Strengths and Limitations of the Study

The strengths of this pilot study are: (1) it is a population based sample of mothers in a postpartum period; (2) the prospective nature of the study allowed us to report prevalence rates at one month, point prevalence rate at three months and incidence rates between one and three months postpartum; (3) the low drop out rate supported the use of a mail out questionnaire in this population.

Limitations include: (1) the relatively small size of the sample which did not allow for observation of more mothers who may have developed depression; (2) small numbers did not allow for subgroups analysis nor for multivariate analysis (3) lack of antenatal follow up decreased accuracy for the observation of true onset time of depressive symptoms (4) lack of assessment of marital and support variables after childbirth, as dynamics of relationships in the family might change postpartum (5) the decision by 50 potential subjects not to participate impacted the heterogeneity of the sample and (6) a reason for non-participation in the study was not collected.

A more elaborate study of this population would include: (1) a sample size calculation which would consider the high non response rate; (2) additional procedures to improve the low drop out rate even further; (3) a more prolonged duration of observation in order to capture cases that develop signs of a depressive condition later than three months; (4) a more intensive examination of those risk factors found to be most significantly related to

PPD in our pilot study; (5) use of improved better recruitment strategies, such as involving obstetricians in the introduction of the study and recruitment during a mother's antenatal visits rather postpartum. The addition of antenatal recruitment to the study design would permit early recognition of risk factors and identification of mothers who may be experiencing depressive symptoms during the pregnancy.

CHAPTER 5: CONCLUSION

5.1 Project Summary

Researchers who have studied PPD have very distinct ways of interpreting the epidemiology and outcome of this condition. Their findings concerning postpartum psychiatric disorders are perplexing and ambiguous (Sharon and Walker, 1992). On the other hand, the field is still open for factual studies of postpartum depression.

The natural history of PPD is unique from other mental conditions (Pitt, 1968; Cox, Rooney, Thomas & Wrate, 1984). Although many mothers experience a period of irritability and sadness known as postpartum blues, the feelings are transient and probably not pathological. It has been consistently found that approximately 10 % of mothers develop PPD within the first weeks after delivery. This rate does not represent a difference from the non-postpartum base rate; however, the inception rate for depression does seem to be raised in the first three months postpartum compared with the following nine months (Cooper & Murray, 1998).

The duration of postnatal depression is similar to that of depression arising at other times, typically the majority of depression episodes remit spontaneously within three to six

months postpartum (Cooper, Campel, Day, Kennerly, Bond & Robson, 1988; Cooper & Murray, 1998). Some mothers however, become incapacitated by moderate or severe depression with residual depressive symptoms that are common up to a year after delivery (O'Hara, 1997). It is crucial to identify mothers with this debilitating illness and provide early treatment interventions.

The theoretical framework for the study was related to the psychosocial theories and theories of situational stress. Inadequate support from partner, family and friends, and other possible life stresses is postulated to increase the vulnerability of women during the postpartum period (Gruen, 1990).

The assessment of peripartum and postpartum risk factors examined in this study were based on a meta-analysis of predictors of postpartum depression by Beck (1996). This meta-analysis directed design of the Postpartum Depression Predictors Inventory (Beck, 1998) which was utilized in this study. This instrument, created as interview tool, was elaborated later by inclusion of additional risk factors by the author (revised meta-analysis with 13 risk predictors by Beck, 2001).

This study attempted to provide information about the incidence and prevalence of postpartum depression in one community, St. John's, Newfoundland and Labrador, and to identify the contributing factors most frequently associated with postpartum depression and the standard treatment practices in the community. Since the use of a self-reported

questionnaire had not previously been implemented in the community for detection of depression, this study also served as a pilot study to explore the feasibility of the approach for future studies. The objectives were to:

1. describe the demographic characteristics of the sample;
2. describe the natural history of postpartum depression in the sample, including duration and intensity;
3. report point prevalence rate for postpartum depression in the sample at one month and three months and the period prevalence rate within three months postpartum;
4. report the incidence rate for postpartum depression at three months;
5. examine the association between selected risk factors and the development of postpartum depression, including history of previous depression, family history of depression, lack of social support, life stress, childcare stress, maternity blues, marital dissatisfaction and antenatal anxiety;
6. comment on the treatment practices currently used in dealing with postpartum depression;
7. comment on the rate and time of 'onset of dropout' for mothers who chose not to participate in the study;
8. comment on the feasibility of using a self-report questionnaire for a community study of prevalence of postpartum depression.

The setting for the study was Grace General Hospital, the main referring hospital for obstetrical services in St. Johns, Newfoundland. This prospective study was designed as a pilot study and the sample was selected on convenience basis. The sample consisted of 71 mothers who were followed for three months postpartum, 62 mothers remained at the end of study observation (drop out rate of 12.7%).

For study purposes it was necessary to apply some form of community screening in order to identify mothers who developed PPD. Considering practical and financial implications of community screening, the self-administered questionnaire has been found to be an acceptable way to identify mothers with PPD (Harris, Huckle, Thomas, Johns & Fung, 1989, Nott & Cutts, 1982). Data collection utilized the EPDS questionnaire, which was specifically designed for community screening of PPD (Cox et al., 1987). Additional questionnaires utilized were the Postpartum Depression Predictors Inventory for identification of contributing factors related to PPD created by Beck (1996) and The Checklist for Demographic Characteristics developed by the investigator.

The data was analyzed according to the objectives of the study. Frequencies for the whole sample and for each EPDS scoring group were identified; the chi-square and the Mann Whitney-U test were utilized to determine the relationships between contributing factors and the EPDS scores.

Findings indicate that: (a) mothers in our sample had a lower prevalence of PPD compared to other studies; (b) 2 of the three mothers who developed PPD symptoms did so within first month postpartum; and (c) the identified significant risk factors were psychiatric variables, selected life, and childcare stress variables.

Psychiatric variables found in this study which to be associated with higher scores on the EPDS include: previous history of depression in the mother, symptoms of anxiety developed during the pregnancy and postpartum blues in the mother shortly after delivery. The additional contributing factors were financial problems and childcare stress factors pertaining the difficulties with infant feeding and sleeping.

5.2 Recommendations for Future Research

Several recommendations for future research arise from the pilot study, as noted below:

1. *Repeat the study with the following modifications*:
   (a) a larger sample size;
   (b) better recruitment practice (by including mothers' obstetricians in recruitment)
   (c) an extended observation period of up to 6 months, in order to follow outcomes in the group that scored above normal on the EPDS

(d) pre-birth recruitment and evaluation of mothers to improve observation of risk factors and increase accuracy about the time of the onset of depressive symptoms.

2. *Further refine the conceptual framework*:

(a) implement a screening tool on multiple occasions as exact timing of the peak of depression may not have been captured using only two occasions (could be arranged by using telephone assessment);

(b) allow mothers to report risk factors, aside from risk factors selected in the PDPI questionnaire, that contribute to their feelings in a positive or negative way;

(c) explore other variables that influence mothers feelings;

(d) link with well-child clinics for administration of postpartum follow up and closer observation of child care stress factors;

(e) explore the cultural and social structuring of the community and lifestyles, that may contribute to the mothers' well being.

5.3 Implications for Clinical Practice

The conduct of this study of postpartum depression has hopefully increased the interest in and awareness of this condition in the community of St. John's. The results of our study have confirmed the findings of previous studies that mothers with a personal history of

depression, and/or a history of depressive symptoms and anxiety during the pregnancy are at increased risk of having depressive symptoms during the first month after delivery.

These results should be disseminated throughout the obstetrical and community health services in the community to encourage implementation of preventive/early intervention measures. For example, it would be good clinical practice for GPs and obstetricians to routinely screen women for evidence of increasing levels of anxiety and depression during the pregnancy as depression and anxiety during the pregnancy are predictors of postpartum depression (O'Hara & Gorman, 2004).

Community health nurses should to be aware of the different features of this condition and continuously screen mothers during well infant visits at community health clinics, using screening questionnaires or asking questions regarding common risk factors related to development of PPD. This activity would also provide an opportunity to educate mothers about symptoms related to this condition and the importance of the mother's mental well being for themselves and their infants.

Close ties among mental health, obstetrical, and community health service providers are crucial for recognition, differentiation and treatment of antenatal and postpartum psychiatric disorders and should be further developed.

5.4 Closing Remarks

The results of this study support the assertion that previous psychiatric history, postpartum blues, childcare stress and other common stressors such as financial stress, impact on maternal vulnerability to postpartum depression. Marital stress factors and family support factors, identified as important in other studies were not significant however in this sample.

The self-report questionnaire was an acceptable screening tool for identifying postpartum depression in this community.

This investigation can be regarded as a pilot study, which identified possible direction for a more elaborate study and attempted to contribute further knowledge in the complex field of postpartum depression.

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APPENDIX A: Longitudinal Studies Examining the Prevalence of PPD and the Risk Factors Related to the Development of the Disorder

A number of longitudinal studies have examined both the prevalence of postpartum depression and the risk factors related to development of this condition during the first year post-partum. These are described below.

(a) Cox, Connor, and Kendell (1982) conducted a prospective study, which followed 105 women through pregnancy and postpartum. The women were interviewed on four occasions (at the 20th, and 35th weeks of pregnancy, and at ten days and within three to five months postpartum) using Standardized Psychiatric Interview (SPI; Goldberg et al., 1970). Authors reported that 13% had depressive illness during the postpartum period while only 4% had depressive illness during pregnancy. Anxiety was common during pregnancy. Depression was less common during pregnancy and was not of the same intensity as that found postpartum. Mothers with severe postpartum blues were particularly at risk of developing persistent depressive symptoms. There was a marked deterioration of marital relationship reported by depressed mothers. No other social or obstetric characteristics were found to be significant.

(b) O' Hara, Neunaber and Zekoski (1984) recruited 99 married mothers from a public clinic, while they were in the second trimester of pregnancy and followed them until the mothers were six months postpartum. Depression was diagnosed through the use

of the self reported questionnaire, the Beck Depression Inventory (BDI; Beck, et al., 1961). The BDI is a semi-structured interview adapted from the Schedule of Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, 1978) using Research Diagnostic Criteria (RDC; Spitzer, Endicott & Robins, 1978) for diagnosis of major and minor depression.

Approximately 9% of women during pregnancy and 12% of women during postpartum were diagnosed as having a major or minor depression. The majority of depressions began at six weeks postpartum and the mean duration of a postpartum episode was 3.3 weeks, with a range of one to six weeks. Hierarchical multiple regression was used to predict the level of depressive symptomatology at nine weeks postpartum. The predictor variables were classified into groups such as: sociodemographic characteristics, variables reflecting the personal vulnerability to depression, measures of life stress and attribution style and self control attitudes. Each set of predictor variables was significant, with the exception of sociodemographic factors. Depression during pregnancy accounted for 21% of the variance for level of postpartum depression symptomatology. Selection of only married mothers for the sample limits generalizability of this study.

(c) Kumar and Robinson (1984) included 119 married primiparae from an antenatal clinic and interviewed them repeatedly at fixed intervals during the pregnancy and until their babies were a year old; follow up was conducted until four years postpartum. Two other groups of subjects (38 primiparae and 39 multiparae women) were included only

postpartum and followed from one (primiparae) to four years later (multiparae). Selection criteria for subjects required that all have stable relationships (married or in a common law relationship). The basic strategy of this study was to use subjects as their own controls and to look for patterns of change over time in relation to particular events. The participants were independently interviewed using semi-structured interviews (SPI; Goldberg, Cooper, Eastwood, Kedward & Shepherd, 1970) and self-reporting questionnaires (GHQ; Goldberg, 1972). The proportion of women who refused to participate was 5.4% and the drop out rate was 4.2%.

The incidence of depressive neurosis in early pregnancy was 10%, and in the first three months after delivery was 14%. The period prevalence of depressive neurosis in the year following delivery was 24%. Many who had become depressed for the first time in their lives continued to experience psychological problems for up to four years after childbirth.

For positive associations with occurrence of depression in early pregnancy and three months postpartum a series of x^2 comparisons were performed followed by log linear analyses. Study findings were that marital problems co-existed with antenatal depression. The period of one to three months postpartum seemed to be the time when mothers were most likely to manifest the symptoms and signs of depression. The mean contributory factors reported at both times were marital conflict ($p<0.001$ ante-natal, $p<0.01$ post-natal) an and severe doubts about having a child ($p<0.001$ ante-natal, $p<0.01$ post-natal). For post-natal occurrence of depression significant associations were found as follows:

mothers older than 30 years of age, mother's childhood separation from the father, infrequent sexual intercourse, dissatisfaction with leisure activity and birth of a premature baby all with $p<0.05$, present problems in relationship with mother ($p<0.01$), spouse with prior psychiatric problems, or detached feelings for baby ($p<0.001$). No relationship was found between antenatal anxiety and postnatal depression. The occurrence of depression at anytime during pregnancy and a year after delivery was correlated with long-term psychiatric problems after childbirth ($x^2=9.38$, $p<0.01$).

The authors concluded that childbearing does have a particular and deleterious effect on mental health. Generalizability of the study is limited due to factors including: lack of biological measures and impossibility to getting such data from sources other than the mother; and sample selection that was devoid of single parents, and consisted of mothers with a high degree of social advantage.

(d) Watson, Elliot, Rugg and Brough (1984) conducted a study in order to report the prevalence of psychiatric disorder in pregnancy and the first postnatal year. A sample was randomly selected from antenatal clinics with a 67.4% response rate. Study subjects were interviewed regularly during pregnancy and the first postnatal year. Psychiatric evaluation was made at approximately the 16^{th} week of pregnancy and again at the sixth postnatal week, using a standardized psychiatric interview (SPI; Goldberg et al., 1970). The study also used various self-reported measures on a monthly basis to assess

psychological difficulties and distress, as well as attitudes and feelings about the pregnancy.

In the early pregnancy, 6% of the women (eight cases) developed psychiatric disorder; five of these cases were diagnosed as affective disorder. Later in the pregnancy, a further nine cases were identified, and seven of these being affective disorder. At six weeks postnatal, 20 women (16%) were classified as 'cases' and 15 of the total cases (12%) were classified as having affective disorder. In five of the 15 women who were clinically depressed six weeks after birth, the onset of that depression was before the birth.

Affective disorders in the puerperium were significantly associated with a positive psychiatric history (previous history of depression and emotionally labile during pregnancy) and problems with the marital relationship. The authors also reported that they did not find an association between postpartum depression and social class, marital status or parity.

(e) Gotlib, Whiffen, Wallace and Mount (1991) recruited women during pregnancy and followed them through one month postpartum. Authors examined the role of psychosocial variables (by using multiple checklist scales) at the onset of postpartum depression. The drop out rate was 31.7% and final sample size was 730 mothers. Depressive symptomatology was tested using the BDI, and for mothers exceeding the

conventional cut-off point of ten for mild depression, a SADS interview to establish RDC diagnosis of minor and major depressive disorder.

During their pregnancy, 75 women developed depression. Women were then divided into two subgroups and further followed. In the group of non-depressed mothers, 32 (4.9%) subsequently received a diagnosis of depression during the postpartum period. Of the 75 women who received a diagnosis of depression during the pregnancy, 21 continued to be depressed after delivery, and 54 recovered. Women who were diagnosed as depressed postpartum exhibited depressive symptoms during the pregnancy, had lower marital satisfaction, higher stress, a greater use of escape-avoidance as coping strategy, and more negative perceptions of the caring they had received from their own parents. Women's perception of being under stress and of rather unsatisfying intimate relationships was also associated with slower recovery from depression. Limitations of the study were: a high attrition rate for the sample; inconvenience for participants due to application of multiple screening questionnaires; and limited duration of follow up postpartum (4.5 weeks).

(f) Campbell, Cohn, Flanagan & Pooper (1992) conducted a longitudinal 24- month study demographically matching 70 depressed primiparae with 59 nondepressed women. Risk factors observed in the depressed mothers were measures of personal and family history, adaptation to pregnancy, and minor pregnancy and delivery complications. Also, they perceived their infants as more difficult to care for and their husbands as less supportive. At 2 months postpartum combination of these variables accounted for 49% of

the variance in depression severity scores. Depressed mothers also showed less positive engagement and more negative affect when observed with their infants at 2 months. These authors also indicate that postpartum depression can be relatively chronic. They observed that for the majority of mothers depression had remitted by 6 months postpartum, while some mothers continued to be depressed throughout the follow-up period, or showed further evidence of subclinical symptoms.

(g) Schaper, Rooney, Kay and Silva (1994) randomly selected 287 mothers from a population of 1139 attending an obstetrics clinic at a large Midwestern medical center. The objectives of this study were to discover the extent of postpartum depression in the population; to determine maternal characteristics associated with the development of depression, and to determine if the use of a standardized assessment scale the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) increased practitioner awareness and treatment of PPD. The EPDS was administered to all women returning for their six-week postpartum visit. The percentage of women who scored 10 and above, defined as being at risk of postpartum depression, was 17% and women scoring 13 and above, defined as likely experiencing postpartum depression and needing further follow up, was 7%. The best predictors of being at risk of an elevated EPDS score (based on multivariate analysis) were marital instability, lack of medical insurance and personal or family history of depression.

(h) O'Hara & Swain (1996) conducted a meta-analysis based on estimates from 59 studies to determine sizes of the effect of risk factors measured during pregnancy, related to development of postpartum depression. The average prevalence rate of postpartum depression was 13%. The principal methodological factor affecting observed prevalence was the period of time under evaluation. Of all examined risk factors the strongest predictors of postpartum depression were past history of psychopathology and psychological disturbance during pregnancy, poor marital relationship and stressful life events. Low social status showed a small but significant predictive relation to postpartum depression.

(i) Wickberg and Hwang (1996) completed a prospective study of postpartum depression in a Swedish sample of 1655 women (from 1874 subject in total) and validated the EPDS in a community sample. The questionnaire was filled out in child health clinic during the regular child check-ups (the child health system in Sweden reaches almost 100% of all families during the first month postpartum). The authors screened mothers at two and three months postpartum with the assumption that they might report only transitory fluctuation in mood. One or two weeks after that, mothers who scored $\geq$ 12 (11.5 was decided as a cut-off point) and random sampling of mothers scoring below this level (to avoid interviewer bias) were interviewed by a clinical psychologist using an observer rating scale; diagnosis of major depression disorder was made according to DSM-III-R criteria. The authors reported 12% (196) scoring above the cut-off point for depression at 2 months, 7.1% (118) at three months and only 4.3 % (72)

scoring above the cut -off point at both 2 and 3 months postpartum. Authors suggested that a two-stage procedure increased both specificity and positive predictive value of the EPDS. Such a procedure could be followed by clinical assessment by the primary care worker to confirm whether or not a clinical depression was present. They also support counseling by health visitors for mothers who are found to be depressed during the screening as well as close collaboration with psychiatric services.

(j) Nielsen, Videbech, Hedegaad, Dalby and Secher (2000) conducted a community based prospective follow up study in Denmark in order to identify risk factors of postpartum depression, to be determined at four months postpartum by using the EPDS questionnaire. Mothers were approached at antenatal clinic and from 6790 delivered, 5252 questionnaires (78%) were completed. Their validation population included 528 mothers who were assessed at four months postpartum. A score of 13 and higher was defined as the threshold for identifying mothers who suffer from PPD. Risk factors were identified by multivariate logistic regression analysis. The authors reported psychological distress in late pregnancy (OR 6.3 [95% CI 4.4-9.1]), perceived social isolation during pregnancy (OR 3.6 [95% CI 1.9-7.0]); high parity (OR 3.8 [95% CI 1.8-8.0]); and a positive history of pre-pregnant psychiatric disease (OR 2.1 [95% CI 1.4- 3.2]) as factors associated with PPD. No association was found between pregnancy or delivery complications, and PPD.

(k) Lee, Yip, Leung and Chung (2000) conducted a study in Hong Kong in order to identify risk factors for PPD using self-reporting questionnaires (EPDS & GHQ) and administered clinical interviews (SPI). From a population of 330, 66.7% agreed to participate in the study. The authors reported that postnatal depression was associated with depression during the pregnancy, elevated depression score at the delivery, and prolonged postpartum blues. Other correlates were temporary housing accommodations; financial difficulties, two or more induced abortions, past psychiatric disorders and elevated neuroticism scores. The authors reported that some risk factors were similar to those found in the West, but others may be unique to the local population.

(l) Webster, Lianne, Dibley & Prichard (2000) conducted a study to evaluate effectiveness of antenatal screening to identify women at risk of postpartum depression. The study recruited a cohort of 901 mothers at an antenatal ward in the Brisbane, Australia. The EPDS was used to screen mothers with threshold of above 12 as cut-off point and follow up was up to 16 weeks postpartum. Of all examined risk factors a low social support, a personal history of mood disorders and past history of postpartum depression were significantly associated with postpartum depression. Authors suggested that objective screening during pregnancy would improve detection of the mothers at risk for postnatal depression.

(m) Chaaya, Campbell, Kak, Shaar, Harb & Kaddour (2002) conducted a study that evaluated the prevalence and determinants of postpartum depression in Beirut and a rural

area (Beka'a Valley).The sample included 396 mothers who were interviewed 24 hours and 3-5 months after delivery. Mothers were screened using the Edinburgh Postnatal Depression Scale during the latter visit. The prevalence of PPD was 21% but was significantly lower in Beirut than the Beka'a Valley (16% vs. 26%). A lack of social support and antenatal depression were significantly associated with PPD in both areas, whereas stressful life events, lifetime depression, vaginal delivery, little education, unemployment, and chronic health problems were significantly related to PPD in one of the areas. Antenatal depression and more than one chronic health problem increased significantly the risk of PPD. A caesarean section decreased the risk of PPD, particularly in Beirut but also in the Beka'a Valley. Authors concluded that caregivers should use pre- and postpartum assessments to identify women at risk for PPD.

(n) O'Hara & Gorman (2004) reviewed the studies which determine etiology of PPD and identify risk factors during pregnancy that predict PPD occurrence. They reported that current or past depression and anxiety disorder, negative stressful life events, marital discord, and poor social support were risk factors measured during pregnancy that show the strongest association with PPD. Also, they commented on performance of the numerous scales used in the prevention trials (aiming to identify a group of women with substantial increased risk for PPD) that incorporated these risk factors and screened women during pregnancy. Their conclusion was that these instruments do identify mothers with increased risk for PPD and can serve as a basis for a conversation between a woman and her healthcare provider. However, some of scales were not adequately

validated and instruments tend to over identify women at risk; at the same time they miss many women who go on to experience PPD.

(o) Eberhard-Gran, Tambs, Opjordsmoen, Skrondal & Eskild (2004) conducted a study from two municipalities in Norway that examined the risk of depression in the postpartum period (first four months after delivery) and compared it to the rest of the postnatal year and the pregnancy period. The level of depression was measured by the Edinburgh Postnatal Depression Scale (EPDS) and an additional symptom check list. The sample consisted of postpartum women (n = 416) and over 50% of the women (n = 259) additionally answered an identical questionnaire either before or after the postpartum period. A threshold of 10 on the EPDS was chosen as the cut off point. The point prevalence of depression (all mothers scored 10 on EPDS) in the first four months postpartum did not differ significantly as compared to other time periods during pregnancy and the postnatal year. This finding remained also after controlling for other risk factors of depression: high score on the life event scale prior depression and poor partner relationship. There was a non-significant trend of lower prevalence of depression during early pregnancy and after the first eight postnatal months. Authors reported that the prevalence of PPD during the first four months postpartum was not higher than prevalence of depression at other time periods during the pregnancy and the first postnatal year.

(p) Faisal -Cury, Tedesco, Kahhale, Menezes, & Zugaib 2004 conducted a study to assess postpartum blues, estimate prevalence of postpartum depression and correlate their relation to life events. This was cross-sectional study that recruited a sample of 113 (from 172 total) women (mothers were mostly from lower working class) in a postpartum ward at the Obstetric Clinic of Sao Paulo, Brazil. The inclusion criteria were single term pregnancy, married (or living with child's father); no past history of depression, psychiatric treatment or alcohol abuse; a newborn without congenital abnormalities and with Apgar score above 7(at 5min after birth). Authors used the Beck Depression Inventory (BDI) (Beck et al., 1961) with cut off of >15 to identify probable cases of depression, as well as different rating scales to evaluate the score of stressful life events during the previous 12 months and coping style in relation to pregnancy. The prevalence of PPD was 15.9%, baby blues (assessed by two scales) were 30.1% and 32.7%. Authors commented about association between PPD and the examined coping patterns. Their finding was that those mothers who showed greater distancing, escape -avoidance, self control and confronting coping patterns were at greater risk of becoming depressed. Univariate analysis showed that: fewer years of education, multiparity, three or more children at home, and 6 or more years of marriage were associated with PPD; while multivariate analysis showed that higher scores for distancing, greater number of children at home and being white were associated with greater risk of PPD.

APPENDIX B: The Edinburgh Postnatal Depression Scale

HOW ARE YOU FEELING? Pt. Code_____

As you have recently had a baby, we would like to know how you are feeling now. Please underline the answer which comes closest to how you have felt in the past 7 days, not just how you feel today.

Here is an example, already completed:

I have felt happy:
Yes, most of the time
Yes, some of the time
No, not very often
No, not at all
This would mean, "I have felt happy some time" during the past week. Please complete the other questions in the same way.

IN THE PAST SEVEN DAYS

1. I have been able to laugh and see the funny side of things:

   As much as I always could
   Not quite so much now
   Definitely not so much now
   Not at all

2. I have looked forward with enjoyment to things:

   As much as I ever did
   Rather less than I used to
   Definitely less than I used to
   Hardly at all

3. I have blamed myself unnecessarily when things went wrong:

   Yes, most of the time
   Yes, some of the time
   Not very often
   No, never

4. I have felt worried and anxious for no very good reason:

   No, not at all

Hardly ever
Yes, sometimes
Yes, very often

5. I have felt scared or panicky for no very good reason:

   Yes, quite a lot
   Yes, sometimes
   No, not much
   No, not at all

6. Things have been getting on top of me:

   Yes, most of the time I haven't been able to cope at all
   Yes, sometimes I haven't been coping as well as usual
   No, most of the time I have coped quite well
   No, I have been coping as well as ever

7. I have been unhappy that I have had difficulty sleeping:

   Yes, most of time
   Yes, sometimes
   Not very often
   No, not at all

8. I have felt sad or miserable:

   Yes, most of the time
   Yes quite often
   Not very often
   No, not at all

9. I have been so unhappy that I have been crying:

   Yes, most of the time
   Yes, quite often
   Only occasionally
   No, never

10. The thought of harming myself has occurred to me:

    Yes, quite often
    Sometimes
    Hardly ever
    Never

An overview of studies which validated the use of the EPDS is provided below:

(a) Cox, Holden & Sagovsky (1987), the team who developed the EPDS, validated the instrument on a sample of 84 British women at 13 weeks postpartum. The health visitors had previously identified women in the sample as being potentially depressed. The questionnaire was completed at the mother's home and placed in a sealed envelope. Subsequently, a trained person (other than a psychiatrist) performed the Standardized Psychiatric Interview (SPI). For some of the participants, the interview was also done at home; for others it was conducted at a local health clinic. An interviewer was blind to the results of the scale scores. To prevent bias effect, twelve additional healthy mothers were included in the interview process.

The criteria used for diagnosis of a depressive illness were the Research Diagnostic Criteria (Spitzer, et al., 1978). The significant score or threshold level at which to identify women at risk of PPD was set at 12.5. At that level, the sensitivity of the instrument was 86%, and specificity was 78%; positive predictive value was 73%. The split-half reliability of the scale was found to be 0.88, and the standardized alpha coefficient was 0.87. High reliability is more important for measures in applied psychology than for measures in basic research; better-standardized instruments have reliability coefficients over 0.90. The authors recommended using a threshold of 9-10 as appropriate for routine use by primary care workers. Authors also suggested that mothers should be further assessed by a health professional.

(b) Gotlib, Whiffen, Mount, Milne & Cordy (1989) examined the prevalence of depression in a heterogeneous sample of 360 pregnant women. Subjects were assessed during the pregnancy and after delivery for the presence of depressive symptomatology and diagnostic status using BDI- self reported questionnaire and SADS interview to establish RDC diagnoses of minor and major depression. At both assessments, approximately 25% reported elevated levels of depressive symptomatology. However, 10 % of the women met diagnostic criteria for depression during the pregnancy and 6.8% postpartum. Only half of the cases of postpartum depression were new onset (3.4%); the remaining women received a diagnosis of depression during the pregnancy.

(c) A study by Harris, Huckle, Thomas, Johns & Fung (1989) included 147 mothers at six to eight weeks postpartum; 65 women with positive microsomal and thyroglobulin antibodies and 82 antibody negative women. An interview by a psychiatrist was completed at six weeks, during regular postpartum follow up. At the time of interview, the psychiatrist was unaware of the woman's antibody status. During the interview, DSM-III criteria were used to assess mental illness. Upon completing the interview, the mother was given the EPDS and the Beck Depression Scale. The mothers were asked to return questionnaires by mail (21 were not returned, 14.3% drop out rate).

The study reported sensitivity of 95%, specificity of 93%, and positive predictive value of 75% for the EPDS, using a cut-off point of 13 for this sample. Limitations of the study

included: (1) the sample was not randomly assigned and half of the women were included because of hyperthyroidism. This condition is related to numerous psychological symptoms and, consequently, study results were not representative of the general population; (2) The BDI, used with the same sample, showed low sensitivity (sensitivity 68% and specificity 88%), missing 6 of 19 cases of major depression; and (3) completion of the EPDS after the psychiatric interview can influence the result of the self-reporting questionnaire since women could be more aware of symptoms that they might have not been otherwise recognized.

(d) Murray and Carothers (1990) recruited 702 primiparous mothers for the purpose of validating the EPDS in the community and reporting performance of the scale at different score levels. The final sample of 646 mothers included only married couples or mothers living with partners who delivered normally a child with no congenital abnormalities. Mothers were initially contacted at 37-42 weeks of pregnancy, and at six weeks postpartum when they completed an EPDS questionnaire. All mothers scoring above or equal to 13 were administered the Standardized Psychiatric Questionnaire, using the Research Diagnostic Criteria for diagnosis of depression. The authors reported that with a cutoff of 12.5, the sensitivity of the EPDS was 67.7%, which was lower than the 86% reported by Cox et al. (1987), and the 95% reported by Harris et al, (1989). There were no reports on reliability correlation coefficients between the diagnostic test and the "gold standard".

(e) Wickberg and Hwang (1996) completed a prospective study of postpartum depression in a Swedish sample of 1655 women, with the intent to validate the EPDS in a community sample. The authors decided to screen mothers before two to three months postpartum with the assumption that they might report only transitory fluctuation in mood. At two and three months postpartum, mothers completed the EPDS. One or two weeks after that, mothers were interviewed by a clinical psychologist using an observer rating scale and diagnosis of major depression was made according to DSM-III-R criteria. Authors validated the EPDS using a cut-off score of 11.5. The reported sensitivity (true positives) of EPDS was 96% while the specificity (true negatives) was 49% and the positive predictive value was 59%. The authors added that the use of a higher cut-off score of 12.5 would reduce the sensitivity to 85%, but would increase the specificity to 63% and the positive predictive value to 64%. The authors also suggested that a two-stage procedure increased both specificity and positive predictive value of the EPDS and that such a procedure could be followed by clinical assessment of the primary care worker to confirm whether or not a clinical depression is present.

(f) Hearn, Iliff, Jones, Kirby, Ormison, Parr, Rout & Warman (1998) used the EPDS to determine if this tool would detect women with a condition not recognized by the primary health care team. The sample consisted of 176 postpartum women. Records from primary care workers were collected, together with assessments of the participants' mental health. Thirty women scored above or equal to 12, however only 13 were

recognized by a professional group as being depressed. Authors suggested that the EPDS should be used routinely in primary care.

(g) Jadresic, Aray and Jara (1995) conducted a study of 180 middle-class mothers attending a health care center in Santiago to validate the Spanish version of EPDS. A psychiatrist, blind to the EPDS results, interviewed mothers at two to three months postpartum. A validation of EPDS was done against the criterion of the Research Diagnostic Criteria, RDC (Spitzer et al., 1978) for diagnosis of depression (major and minor) that were defined as 'gold standard'. Altogether, 11 women met the RDC criteria. Validity coefficients for the EPDS were calculated to determine the best case/non-case threshold, which was found to be 9/10. Using that threshold, the sensitivity and specificity of EPDS were found to be 100% and 80%, and the positive predictive value 37%, respectively. The incidence rate of postpartum depression in Chile is 9.2%. The authors reported an alpha coefficient (measure of internal consistency) of 0.77.

(h) Cooper and Murray (1995) studied course and recurrence of postpartum depression in two groups of primiparous women experiencing an index episode of postpartum depression. One group had no previous history of mood disorder and the second group had previous affective disturbance. These two groups, together with a psychiatrically well control group, were studied for five years. The original sample included 702 mothers.

At six weeks, the mothers were sent EPDS, and 92% of the sample continued in the study (8% drop out rate). All those with a score of at least 13 were interviewed at two to three months postpartum by a psychiatrist or psychologist using the Standardized Psychiatric Interview (SPI) to identify minor definite and major episodes of depression. These women were also interviewed with SAD-L (Edicott & Spitzer, 1978) to ensure that there had been no depression before or since delivery. This procedure yielded: 34 women in whom postpartum depression was the first mood disturbance; 21 women in whom the postpartum depression was a recurrence of previous affective disturbance; and a control group of 40 women.

The investigators followed these mothers for five years and found that recurrence of PPD was much higher in the group who had first onset of PPD than in those who had recurrent depression (41% vs. 18%). The duration of depressive episode for the group with a de novo onset was shorter than that for those with a recurrent episode ($p<0.05$). During 18 months, 9.5% of controls experienced an episode of depression. The selection of the sample limits the generalizeability of this study, psychiatric interviews limited to mothers scoring above 12 not including a random sample of lower scoring subjects, and the long follow up may have affected adherence to study protocol.

(i) Georgiopoulos, Bryan, Wollan and Yawn (2001) conducted a study where universal screening was introduced to all community postnatal care sites for the Mayo Clinic in Rochester, USA, using the EPDS questionnaire. Authors obtained one-year outcome

assessments pertaining to the diagnosis and treatment of PPD by reviewing medical records. They reported that 20% of the sample of 342 mothers had been documented with a diagnosis of PPD, resulting in an estimated population rate of 10.7%. Depression was documented in 35% of the women with elevated EPDS scores (≥ to 10) compared with 5% of the women with low EPDS scores (< 10). The authors reported that the rate of diagnosis of PPD in this community increased from 3.7% before routine use of EPDS to 10.7% following screening. They concluded that implementation of routine EPDS at six weeks postpartum was associated with an increase in the rate of diagnosed PPD.

The Edinburgh Postnatal Depression Scale has also been used as a screening tool (without validation using a gold standard) in two similar prospective studies of post partum depression in the USA, as discussed below.

(j) Roy, Gang, Cole, Rusky, Reese and Weisbord (1993) recruited a sample of 308 women from the urban northeast. **(k) Fredel & Evans (1995)** in a prospective study of postpartum depression, recruited a convenient sample of 181 postpartum mothers at a rural health clinic in the southern USA. The study procedure was similar in both studies. A cover letter explaining the study, along with a copy of the EPDS, was given to the mother during her pregnancy care visits and she was asked to bring it with her for her postpartum visit.

In both studies, authors approved the use of the EPDS for screening of PPD. However it was not indicated if a gold standard was used for validation of the instrument for each population. Fredel & Evans (1995) suggested that the title of "postpartum depression" might have negatively influenced the rate of return (60%) in the Roy et al.(1993) study and consequently increased bias in data collection. An alternative description by Fredel et al., 1995 "a study of maternal feelings" had better return rate (only few women did not return the questionnaire).

The range of total EPDS scores in the Fredel & Evans (1995) study, 0-27 was comparable to the range of scores 0-24 in a Roy et al. (1993) study. The incidence of participants scoring 12 or above on the EPDS in that study (19.9%) was higher than 17.4% reported by Roy et al. (1993). In both studies there was no report on how many mothers were diagnosed with depression, but five women were referred for further assessment in the Fredel & Evans (1995) study.

(l) Eans, Heron, Francob, Oke & Golding (2001) conducted a longitudinal cohort study where the main objective was to follow up mother's mood during the pregnancy and postpartum. The investigators screened a community sample of 9028 in Avon (U.K.) and used EPDS as a measure for assessment of depressive disorder with the threshold cut off at 13 and follow up to eight months postpartum. They reported 11.8% of women scored above the threshold (indicating probable depression) at 18 weeks and 13.5% at 32 weeks of pregnancy, 9.1% at 8 weeks and 8.1% at 8 months postpartum. The mothers had higher EPDS scores in pregnancy than postpartum and distribution of total scores and

individual symptoms did not differ before and after childbirth. The authors concluded that there is no difference in the prevalence or severity between depression during pregnancy and postpartum depression.

(m) Josefsson, Berg, Nordin and Sydsjo (2001) conducted a longitudinal community based study which included 1158 mothers in Sweden and used the EPDS for detecting PPD. They followed mothers on multiple occasions starting first during the pregnancy (from 35-36 weeks), then in the maternity ward, at 6-8 weeks and 6 months postpartum. Prevalence of PPD during pregnancy was 17%, 18% while in the maternity ward, 13% at 6-8 weeks after childbirth, and 13% at 6 months postpartum. The authors found significant correlation between antenatal and postpartum depressive symptoms ($p<0.0001$). They concluded that detection of women with risk of PPD could be done during late pregnancy during the mothers' visits to antenatal care clinic.

APPENDIX C: Human Investigation Committee Approval

Memorial
University of Newfoundland

Human Investigation Committee
Research and Graduate Studies
Faculty of Medicine
The Health Sciences Centre

1999 03 18

Reference #98.182

Ms. Miranda Tomasic
20 Roche Street
St. John's, NF

Dear Dr. Tomasic:

This will acknowledge receipt of your correspondence dated **1999 03 04**, wherein you request clarify issues and provide a revised script and consent form for the research application entitled "**A Prospective Study of the Prevalence and Risk Factors Related to Postpartum Depression. A Study of Maternal Feelings After Delivery**"

At a meeting held on **March 11, 1999**, the Human Investigation Committee granted full approval of your research study.

I wish you success with your study.

Sincerely,

H.B. Younghusband, PhD
Chairman
Human Investigation Committee

HBY\jglc

C Dr. K.M.W. Keough, Vice-President (Research)
Dr. R. Williams, Vice-President, Medical Affairs, HCC
Dr. D. Neville, Supervisor
Dr. D. Craig, Supervisor
Dr. P. Parfrey, Supervisor

SUPPORT

APPENDIX D:

FACULTY OF MEDICINE - UNIVERSITY OF NEWFOUNDLAND
AND
HEALTH CARE CORPORATION OF ST. JOHN'S
Consent to Participate in Biomedical Research

Title: A prospective study of prevalence and risk factors related to postpartum depression. A study of maternal feelings after delivery.

Investigators:	Dr. Miranda Tomasic	Phone: 738- 7284
	Dr. Doreen Neville	Phone: 737- 4677
	Dr. P. Parfrey	Phone: 737- 7261
	Dr. D. Craig	Phone: 737- 6661

You have been asked to participate in this research study. Participation in this study is entirely voluntary. You may decide not to participate or withdraw from this study at any time without affecting your treatment or the treatment of your child.

The investigator will maintain confidentiality concerning participants. The investigator will be available at all times during this study, should any problems or questions arise.

Purpose of Study:

The purpose of this study is to determine how often mothers experience depression in the first three months after childbirth and what are the risk factors related to the development of this condition. We would also like to know whether the use of a questionnaire will help in the early recognition of depression after childbirth and what treatments are currently used to relieve symptoms of depression that occurs after delivery.

Description of Procedures and Tests:

1. At the beginning of the study you will be asked to answer general questions about yourselves and about your family and about presence of risk factors related to development of postpartum depression.
2. You will be asked to fill out a questionnaire at one month and three months after delivery. A letter will be mailed to you with a questionnaire and will include a self-addressed envelope. If we do not receive a response from you within one week, we will send you a follow up letter with another enclosed questionnaire and remind you to please complete it and return it. If we still do not receive a response, we will telephone you and ask if you have received the letters and if you are still willing to continue in the study.

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3. The questionnaire will consist of ten simple questions about your feelings during the previous seven days. Every question is scored, and the sum of the total scores will be calculated after you complete the questionnaire.
4. If you score below the cutoff on the questionnaire, we will notify you by telephone and letter that your score is within the normal range for the mothers of young infants.
5. If your score indicates that you may be at a potential risk of experiencing depression, you will be notified by telephone and letter and advised to contact your GP or community health nurse.
6. If your score indicates that you may be at risk of experiencing depression or that you may already be experiencing depression, you will be notified by telephone and letter and advised that you should contact your GP or community health nurse, who will help you to decide whether you need further care. The research personnel will also send a follow-up questionnaire for you to complete in order to confirm your previous score.

Duration of Subject Participation:
The duration of the study for all mothers will be a maximum of four months after delivery.

Foreseeable Risk, Discomforts, or Inconveniences:
1. There will be a slight chance that you may be experiencing symptoms related to depression which are not recognized in the questionnaire.
2. You may not actually be experiencing symptoms of depression yet still score above the threshold on the questionnaire. Consequently, you may be asked to fill out the additional questionnaire, even though you are not experiencing depression.

If you have any concerns about the way you feel, or you are under the impression that the questionnaire result does not reflect the way you really feel at any time during the study, we recommend that you contact your family doctor or community health nurse and she/he will be able to help you to decide if you need further help.

Benefits Which the Subject May Receive:
By participating in this study, postpartum depression may be detected early. That would enable you to arrange support, counseling, or other treatment.

Liability Disclaimer:
"Your signature on this form indicates that you have understood, to your satisfaction, the information regarding your participation in this research project and agree to participate as a subject. In no way does this waive your legal rights nor release the investigators or involved institutions from their legal and professional responsibilities."

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Other Relevant Information:

Other conditions that are part of this agreement:
1. All personal identifying characteristics will be removed from the questionnaires. Your name and corresponding code will be kept on file, only for the investigator, in order to evaluate the questionnaire score.
2. During the study, you will be asked to answer if you are under any treatment for depression regardless of your score result on the questionnaire.

I, _____, the undersigned, agree to my participation in the research study described.

Any questions that I may had have been answered and I understand what is involved in the study. I realize that participation is voluntary and that there is no guarantee that I will benefit from any involvement. I acknowledge that a copy of this form has been given to me.

_____
(Signature of Participant) (Date)

_____
(Witness Signature) (Date)

To be signed by investigator:
To best of my ability I have fully explained to the subject the nature of this research study. I have invited questions and provided answers. I believe that the subject fully understands the implications and voluntary nature of the study.

_____
(Signature of Investigator) (Date)

Phone Number _____

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APPENDIX E: Checklist for Demographic Characteristics

Today's date: _____

Pregnancy week at delivery: _____

Number of babies delivered: _____

Baby's date of birth _____ **Birth weight**_____

Mother's age _____ **Baby's place in the family** 1 2 3 4 5 6 7

Age of children at home_____

Pt. Code_____

Marital status:

Married _____

Common law relationship _____

Single parent _____

Separated _____

Divorced _____

Housing:

Own house, apartment _____

Renting _____

Employment:

Full time _____

Part time _____

Housewife _____

Employment status of partner:

Full time _____

Part time _____

Unemployed _____

Number of people sharing same home:

Number _____

APPENDIX F:

The Postpartum Depression Predictors Inventory

The answers for the following questions collected by the investigator during the initial patient interview.

Pt. Code_____		
Please check yes or no!	Yes	No
Have you felt depressed during your pregnancy?		
If yes, when and how long have you been feeling depressed?		
If yes, how mild or severe would you consider your depression?		
Have you been feeling anxious during your pregnancy?		
If yes, how long have you been feeling that way?		
Before this pregnancy, have you ever been depressed?		
If yes, when did you experience this depression?		
If yes, have you been under a physician's care for this past depression?		
If yes, did the physician prescribe any medication for your depression?		
Do you feel you receive adequate emotional support from your partner?		
Do you feel you receive adequate instrumental support from your partner (e.g., help with household chores or babysitting)?		
Do you feel you can rely on your partner when need help?		
Do you feel you can confide in your partner?		
(Repeat same questions for family and again for friends)		
Are you satisfied with your marriage (or living arrangement)?		
Are you currently experiencing any marital problems?		
Are things going well between you and your partner?		
Has any close relative (grandparent, parent, brother, sister) had course of psychiatric treatment either as an out-patient or as an in-patient?		

The Postpartum Depression Predictors Inventory (continued)

Are you currently experiencing any stressful events in your life such as:	Yes	No
Financial problems		
Marital problems		
Death in family		
Serious illness		
Moving		
Unemployment		
Job change		

The Postpartum Depression Predictors Inventory (continued)

At **one month** after delivery, the following questions were sent to the mother by mail together with the EPDS questionnaire.

Pt. Code_____		
Please check yes or no!	Yes	No
Is your infant experiencing any health problems?		
Are you having problems with your baby's feeding?		
Are you having problems with your baby's sleeping?		
Would you consider your baby difficult to console?		
Are you breastfeeding your baby?		
Did you experience a brief period of tearfulness and mood swings during the first week after delivery?		
Have you received any treatment for depression (medication or other including counseling) after childbirth?		
If yes, which kind?		
Medication?		
If yes, please provide the name of medication.		
Counseling?		
Psychotherapy?		
Other?		
If other, please specify which kind of treatment.		

The Postpartum Depression Predictors Inventory (continued)

Three months after delivery, the following questions was sent to the mother by mail together with the EPDS questionnaire.

	Pt. Code_____	
Please check yes or no!	Yes	No
Is your infant experiencing any health problems?		
Are you having problems with your baby's feeding?		
Are you having problems with your baby's sleeping?		
Would you consider your baby difficult to console?		
Are you breastfeeding your baby?		
Has community health nurse contacted you in the previous three months?		
Have you received any treatment for depression (medication or other including counseling) after childbirth?		
If yes, which kind?		
Medication?		
If yes, please provide the name of medication.		
Counseling?		
Psychotherapy?		
Other?		
If other, please specify which kind of treatment		

APPENDIX G:

Evaluation of the Instruments Form

The Pre-test Questionnaire

1. (a) Did you feel any of the questions are confusing?

_____ Yes _____No

(b) If yes, which one/s and why?

_____

_____

2. (a) Did you think the length of questionnaire was:

_____ Too short _____ Just right _____ Too long

(b) How long did it take you to complete the questionnaire?

_____ minutes

3. (a) Was/ were any of the word/s used in the questionnaire difficult to understand?

_____Yes _____No

(b) If yes, which word/s?

_____

_____

4. (a) Were you offended by any of these question/s asked?

_____ Yes _____No

(b) If yes, which one/s, please explain.

_____

Please write any additional comments in the space provided.

_____

APPENDIX H: Summary of Frequencies

The Edinburgh Postnatal Depression Scale In the Past Seven Days	One month postpartum		Three months postpartum	
Variable	N	%	N	%
1.I have been able to laugh and see the funny side of things:				
As much as I always could	41	64.1	57	91.9
Not quite so much now	22	34.4	4	6.5
Definitely not so much now	1	1.6	1	1.6
Not at all	-		-	
Total	64		62	
2.I have been able to laugh and see the funny side of things:				
As much as I always could	52	81.3	53	85.5
Not quite so much now	11	17.2	9	14.5
Definitely not so much now	1	1.6	-	
Not at all	-		-	
Total	64		62	
3.I have blamed myself unnecessarily when things went wrong:				
Yes, most of the time	1	1.6	-	
Yes, some of the time	14	21.9	13	21
Not very often	35	54.7	30	48.4
No, never	14	21.9	19	30.6
Total	64		62	
4.I have felt worried and anxious for no very good reason:				
No, not at all	29	45.3	28	45.2
Hardly ever	11	17.2	22	35.5
Yes, sometimes	22	34.4	11	17.7
Yes, very often	2	3.1	1	1.6
Total	64		62	
5.I have felt scared or panicky for no very good reason:				
Yes, quite a lot	1	1.6	-	
Yes, sometimes	8	12.5	4	6.4
No, not much	14	21.9	14	22.6
No, not at all	41	64.1	44	71
Total	64		62	
6.Things have been getting on top of me:				
Yes, most of the time I haven't been able to cope at all	2	3.1	-	
Yes, sometimes I haven't been coping as well as usual	13	20.3	12	19.3
No, most of the time I have coped quite well	29	45.3	28	45.2
No, I have been coping as well as ever	20	31.3	22	35.5
Total	64		62	

The Edinburgh Postnatal Depression Scale In the Past Seven Days (continued)	One month postpartum		Three months postpartum	
Variable	N	%	N	%
7. I have been unhappy that I have had difficulty sleeping:				
Yes, most of the time	3	4.7	1	1.6
Yes, sometimes	5	7.8	2	3.2
Not very often	14	21.6	16	25.8
No, not at all	42	65.6	43	69.4
Total	64		62	
8.I have felt sad or miserable:				
Yes, most of the time	1	1.6	-	-
Yes quite often	3	4.7	2	3.2
Not very often	33	51.6	28	45.2
No, not at all	27	42.2	32	51.6
Total	64		62	
9.I have been so unhappy that I have been crying:				
Yes, most of the time	1	1.6	-	
Yes, quite often	2	3.1	-	
Only occasionally	21	32.8	13	21.0
No, never	40	62.5	49	79.0
Total	64		62	
10.The thought of harming myself has occurred to me:				
Yes, quite often	-		-	
Sometimes	1	1.6	-	
Hardly ever	1	1.6	1	1.6
Never	62	96.9	61	98.4
Total	64		62	

Checklist for Demographic Characteristics,

Participants, n=71

Mother age (min.-max.; mean; S.D.)	19- 40; 30.14; 4.22		71 / 100%
Variable	N	%	Total N / %
Marital status:	71		
Married	55	77.5	
Common law relationship	13	18.3	
Single parent	3	4.2	
Separated	0		
Divorced	0		
Housing:			71 / 100
Own house, apartment	54	76.1	
Renting	17	23.9	
Employment:			71 / 100
Full time	36	50.7	
Part time	15	21.1	
Housewife	19	26.8	
Student	1	1.4	
Employment status of partner:			69 / 97
Full time	58	50.7	
Part time	5	21.1	
Unemployed	3	26.8	
Student	3	1.4	
Number of people sharing same home: (N; min. -max.; median; S.D.)	71; 2-7; 4; 0.99		71 / 100
Baby Place in family (N; min.-max.; median; S.D.)	71; 1- 4; 2; 0.76		71 / 100

Non-participants, n=50

Mother age (N, min. -max., mean, S.D.)	46, 19-38, 28.98, 4.74		46 / 92%
Variable	N	%	Total N / %
Marital status:	47		47 / 94
Married	34	72.3	
Common law relationship	4	8.5	
Single parent	9	19.2	
Separated			
Divorced			
Baby place in family (N; min. -max.; median; S.D.)	47;1- 4; 2; 0.87		47 / 94

The Postpartum Depression Predictors Inventory
(the initial interview)

Variable	Yes		No		Total
	N	%	N	%	N
Have you felt depressed during your pregnancy?	10	14.1	61	85.9	71
If yes, when and how long have you been feeling depressed (months)? Min-Max, Mean, S.D.: 1-9, 3.7, 3.2.					
If yes, how mild or severe would you consider your depression? (mild=1, moderater=2, severe=3); Min-Max, Mean, S.D.,: 1-2, 1.3, 0.48.					
Have you been feeling anxious during your pregnancy?	22	31.0	49	69.0	71
If yes, how long have you been feeling that way (months)? Min-Max, Mean, S.D.: 1-9, 4.55, 3.89.					
Before this pregnancy, have you ever been depressed?	13	18.3	58	81.7	71
If yes, when did you experience this depression, duration (months)? Min-Max, Mean, S.D,: 1-24, 9.91, 9.48.					
If yes, have you been under a physician's care for this past depression?	9	69.2	4	30.8	13
If yes, did the physician prescribe any medication for your depression?	3	23.1	10	76.9	13
Do you feel you receive adequate emotional support from your partner?	66	97.1	2	2.9	68
Do you feel you receive adequate instrumental support from your partner (e.g., help with household chores or babysitting)?	65	95.6	3	4.4	68
Do you feel you can rely on your partner when need help?	67	98.5	1	1.5	68
Do you feel you can confide in your partner?	68	100			68
Do you feel you receive adequate emotional support from your family?	68	87.3	9	12.7	71
Do you feel you receive adequate instrumental support from your family (e.g., help with household chores or babysitting)?	62	87.3	9	12.7	71
Do you feel you can rely on your family when need help?	68	95.8	3	4.2	71
Do you feel you can confide in your family?	62	87.3	9	12.7	71
Do you feel you receive adequate emotional support from your friends?	68	95.8	3	4.2	71
Do you feel you receive adequate instrumental support from your friends (e.g., help with household chores or babysitting)?	57	80.3	14	19.7	71
Do you feel you can rely on your friends when need help?	68	95.8	3	4.2	71
Do you feel you can confide in your friends?	66	93	5	7	71
Are you satisfied with your marriage (or living arrangement)?	66	97.1	2	2.9	68
Are you currently experiencing any marital problems?	0		68	100	68
Are things going well between you and your partner?	67	98.5	1	1.5	68
Has any close relative had course of psychiatric treatment either as an out- patient or as an in-patient?	22	31	49	69	71

The Postpartum Depression Predictors Inventory
(the initial interview) cont.

Variable	Yes		No		Total
	N	%	N	%	N
Are you currently experiencing any stressful events in your life such as:					
Financial problems	9	12.7	62	87.3	71
Marital problems	0		68	100	68
Death in family	6	8.5	65	91.5	71
Serious illness	11	15.5	60	84.5	71
Moving	9	12.7	62	87.3	71
Unemployment	3	4.2	68	95.8	71
Job change	9	12.7	62	87.3	71
Previous unresolved relationship issues	2	2.8	69	97.2	71

The Postpartum Depression Predictors Inventory
(follow up at one and three months postpartum)

	One month				Total	Three months				Total
	Yes		No			Yes		No		
Variable	**N**	**%**	**N**	**%**	**N**	**N**	**%**	**N**	**%**	**N**
Is your infant experiencing any health problems?	2	3.1	62	96.9	64	6	9.7	56	90.3	62
Are you having problems with your baby's feeding?	8	12.5	56	87.5	64	2	3.2	60	96.8	62
Are you having problems with your baby's sleeping?	16	25	48	75	64	6	9.7	56	90.3	62
Would you consider your baby difficult to console?	6	9.4	58	90.6	64	1	1.6	61	98.4	62
Are you breastfeeding your baby?	43	67.2	21	32.8	64	31	50	31	50	62
Did you experience a brief period of tearfulness and mood swings during the first week after delivery?	33	50.8	32	49.2	64 +1*					
Have you received any treatment for depression (medication or other including counseling) after childbirth?	2	3.1	62	96.9	64	2	3.2	60	96.8	62
If yes, which kind?										
Medication?	2	3.1	62	96.9	64	2	3.2	60	96.8	62
If yes, please provide the name.	Zoloft					Zoloft				
Counseling?	1	1.6	63	98.4	64			62	100	62
Psychotherapy?			64	100	64			62	100	62
Other?			64	100	64			62	100	62
If other, please specify which kind of treatment										

*Reported at three months