Demographic, Reproductive, and Psychosocial Predictors of Mood Change in the Postpartum Period

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Abstract

The purpose of this study was to examine demographic, reproductive, and psychosocial predictors of mood change in the postpartum period. In a prospective design, 33 women completed either an online or paper and pencil questionnaire in Week 1 postpartum and then again a month later. Mood was measured using the combined Edinburgh Postnatal Depression Scale and Beck Depression Inventory-II scores, Elation Scale total scores, as well as a composite mood scale which measured mood on a continuum from elation to depression. Significant predictors of negative mood change were history of abortion, past negative mood change in the postpartum period, high levels of perceived stress, marital dissatisfaction, problems feeding baby, less sleep than usual, weaker bond with infant, and a negative effect of premenstrual syndrome on mood. Significant predictors of positive mood change were low levels of perceived stress, seldom feeling fatigued or tired, stronger bond with infant, experiencing job change, younger age, negative history of abortion, a positive effect of puberty on mood, and a positive effect of premenstrual syndrome on mood. Although limited by the relatively small sample size, predictors for a number of theoretically relevant variables were confirmed, and several hitherto unexamined variables were found to be worthy of future investigation.

Demographic, Reproductive, and Psychosocial Predictors of Mood Change in the Postpartum Period

It has become increasingly clear that there is a strong association between mood and reproductive events. For instance, before the commencement of adolescence, the rates of depression are similar for boys and girls. However, these rates dramatically change as girls reach menarche, or their first menstrual period. At approximately 12.5 years of age, girls become two times more likely to develop depression compared to boys (Steiner, Dunn, & Born, 2003). The prevalence of major depression in individuals aged 15 to 24 in the United States is 10.5% for men, and as high as 20.6% for women (Steiner et al., 2003). The shift in the occurrence of mood disorders in girls at menarche is most likely associated with changes in gonadal hormones. Harlow, Cohen, Otto, Spiegelman, and Cramer (2004) found that there was an increased risk for developing depression with an earlier age at menarche. Several other menstrual characteristics, including irregular cycles, shorter or longer than average menstrual flow, or heavy menstrual flow volume increased the risk of developing depression later on in life. As discussed below, phase of menstrual cycle has also been associated with mood change.

The menstrual cycle consists of a sequence of events leading to the shedding of the lining of the uterus (Luria, Friedman, & Rose, 1987). The menstrual cycle can be broken down into three phases: the follicular phase, ovulation, and the luteal phase. The follicular phase occurs in the first 12 to 14 days of the cycle. In this stage, follicular-stimulating hormone (FSH) is released from the pituitary gland, which stimulates the ovaries and the surrounding tissue, referred to as follicles. During this phase, an ovum, or egg is prepared to be released and the ovaries increase their production of estrogen,

which stimulates the uterine lining to grow (Luria et al., 1987). In the ovulation phase, the ovary releases an egg due to the release of luteinizing hormone (LH) from the pituitary gland. In this phase, the egg travels down through the fallopian tube (Luria et al., 1987). Finally, in the luteal phase of the menstrual cycle, the corpus luteum develops in the place of the ovarian follicle that ruptured, and it secretes progesterone. Together, progesterone and estrogen stimulate the lining of the uterus, or the endometrium, to develop tissue and blood vessels which will nourish the egg that attaches (Luria et al., 1987). If an egg fails to attach to the lining of the uterus within two weeks, the corpus luteum will decay and degenerate, causing estrogen and progesterone levels to drop. The declining levels of estrogen and progesterone will signal the shedding of the lining of the uterus, which is referred to as menstruation.

The menstrual cycle itself has been linked to mood fluctuations, particularly in terms of the condition referred to as premenstrual syndrome (or PMS). As many as 75% of women who experience regular menstrual cycles develop symptoms of PMS, which include headaches and minor mood changes (Steiner et al., 2003). A smaller percentage of women, between 3 and 8%, experience a more severe version of PMS, called premenstrual dysphoric disorder (PMDD). Women with PMDD experience emotional symptoms, including anxiety, despair, mood swings, irritability, and low energy, as well as physical symptoms including bloating, headaches, and muscle pain, which greatly interfere with their everyday functioning. To receive a diagnosis of PMDD, these symptoms must be present only during the late luteal phase of the menstrual cycle, and fade within a few days after the beginning of menstruation (Burt & Stein, 2002).

Not only are women who currently have PMDD at risk for developing major depression later on in life, but some women with major depressive disorder experience symptom exacerbation during the late luteal phase of the menstrual cycle. It is estimated that between 30 and 70% of those with PMDD have experienced a past episode of depression, and that 29% of those women with children have experienced postpartum depression (Burt & Stein, 2002). For instance, Bloch, Rotenberg, Koren, and Klein (2005) followed women through the early postpartum period and found that the prevalence of PMDD was significantly greater in women who developed postpartum depression or postpartum blues compared to women who did not (in addition see Bloch, Rotenberg, Koren, & Klein, 2006). These findings show that many women are susceptible to mood fluctuations, by means of normal menstrual cycle variation or due to irregularities that occur at the end of the menstrual cycle.

Menopause is another reproductive event that is associated with mood fluctuations. Menopause occurs as the menstrual cycle prepares to stop and there is a gradual depletion in estrogen and other gonadal hormones (Luria et al., 1987). Menopause occurs when a women experiences 12 consecutive months of amenorrhea, or the absence of menstrual periods (Burt & Stein, 2002). The average age for women to experience menopause is 51 years (Burt & Stein, 2002). Perimenopause, on the other hand, refers to the 5 to 7 year period where women shift from regular menstrual cycles until the time they no longer ovulate (Burt & Stein, 2002).

Many studies have shown an increased risk of developing depression in perimenopause or menopause (Burt & Stein, 2002; Cohen, Soares, Vitonis, Otto, & Harlow, 2006; Douma, Husband, O'Donnell, Barwin, & Woodend, 2005). For instance,

in a longitudinal study Cohen et al. (2006) followed 460 premenopausal women aged 36 to 45 who did not have a lifetime history of major depression. Results of this study revealed that women who entered perimenopause were twice as likely to develop significant depressive symptoms compared to women who remained in the premenopausal stage (after adjusting for age at enrolment in the study). In addition, Gregory, Masand, and Yohai (2000) asked 72 women who were in treatment for major depression to fill out a questionnaire to examine mood across four different reproductive events. Significant correlations emerged between premenstrual and perimenopausal mood ratings as well as postpartum and perimenopausal mood ratings. Thus, it appears that women who experience depression at one reproductive event are more likely to develop recurrent depression later in life after another major reproductive event (also see Stewart & Boydell, 1993). Furthermore, estrogen replacement during this period has been shown to be an effective antidepressant (Carranza-Lira & Valentino-Figueroa, 1999; de Novaes Soares, Almeida, Joffe, & Cohen, 2001; Stahl, 2001).

Pregnancy and the Postpartum

Pregnancy is typically thought of as the most prominent reproductive event in a woman's lifetime. Pregnancy begins at conception when the sperm fertilizes the ovum in the fallopian tube (Rice, 1989). In the luteal phase of the menstrual cycle, if the egg becomes fertilized, it travels down the fallopian tube into the lining of the uterus. Pregnancy occurs when the egg is properly nourished by the endometrium. Throughout pregnancy the corpus luteum grows and secretes both estrogen and progesterone (Rice, 1989). Estrogen and progesterone levels increase throughout pregnancy, but after

delivery when the placenta is lost, estrogen and progesterone levels fall drastically within 24 to 48 hours (Spinelli, 1998).

The postpartum period has been attracting a lot of attention in the past decade due to the growing recognition of mood-related episodes at this time. The postpartum period is a period of particular vulnerability for mood-related clinical conditions, ranging from maternity blues, to postpartum depression, to postpartum elation or hypomania, to mania, to postpartum psychosis. Maternity blues occur within two weeks after giving birth, and they are considered to be a milder version of postpartum depression (Stowe & Nemeroff, 1995). Maternity blues are thought to be a normal antecedent to childbirth, occurring in 50% to 80% of women (Stowe & Nemeroff, 1995). The symptoms of maternity blues include dysphoria, irritability, anxiety, and insomnia, and usually peak around the fifth day postpartum and typically subside by day 12 postpartum (Steiner et al., 2003). It is believed that women who experience maternity blues are at greater risk for later developing postpartum depression.

Postpartum depression is a very serious disorder as it can interfere with the mother-infant interaction, which can damage the child's early development as well as affect the entire family. According to the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*, postpartum depression refers to a major depressive disorder qualified with the phrase "with postpartum onset" (American Psychiatric Association, 2000). Thus, the symptoms of postpartum depression are the same as the criteria for a Major Depressive Episode as listed in the *DSM-IV-TR* (i.e., Five or more of the following symptoms: depressed mood, markedly diminished interest or pleasure, significant weight loss or weight gain, insomnia or hypersomnia, psychomotor agitation or retardation,

fatigue or loss of energy, feelings of worthlessness or excessive or inappropriate guilt, diminished ability to think or concentrate, and recurrent thoughts of death or suicidal ideation). Other symptoms that are common in the postpartum period include mood lability, anxiety, preoccupation with the well-being of the infant, over-intrusiveness, and disinterest or fear of being alone with the infant (American Psychiatric Association, 2000).

Postpartum depression is a very common disorder, with a prevalence rate between 10 and 15% in women in the weeks following delivery (Steiner et al., 2003). The duration of postpartum depression ranges drastically from 3 months up to 14 months, depending on the severity of the disorder (Stowe & Nemeroff, 1995). For women who develop depression after the birth of their first child, there is a 50% risk of developing depression in future pregnancies (Bloch et al., 2000; Sharma, 2005).

Although the postpartum period is most strongly associated with depressive symptoms, the other end of the mood spectrum is also of importance during this period. Postpartum elation refers to hypomanic symptoms that have recently been found to be more common than expected in the first week postpartum. Although hypomania has been found to occur in between 10 and 18% of mothers (using a cut-off score of eight on the Highs Scale), the *DSM-IV-TR* does not allow for the "with postpartum onset" specifier to be used for hypomania (American Psychiatric Association, 2000; Glover, Liddle, Taylor, Adama, & Sandler, 1994; Lane et al., 1997).

Postpartum elation can be described as feeling excessively happy, lively, over excited, and feeling that one is more important or stronger than usual (Heron, Craddock, & Jones, 2005). Although the terms postpartum elation and hypomania are often used

interchangeably, in the current study postpartum elation generally refers to sub-threshold hypomania whereas postpartum hypomania generally refers to the mood episode as defined by the *DSM-IV-TR* (i.e., three or more of the following symptoms: inflated self-esteem or grandiosity, decreased need for sleep, more talkative than usual or pressure to keep talking, flight of ideas, distractibility, increase in goal-directed activity, and excessive involvement in pleasurable activities; American Psychiatric Association, 2000).

Postpartum elation or hypomania has been found to be associated with an increased risk of developing later postpartum depression (Heron et al., 2005). In a study by Hannah et al. (1993), 10 out of 62 postpartum women met Research Diagnostic Criteria for hypomania in the first week postpartum, and 8 of those 10 women went on to develop either minor or major depression.

Postpartum hypomania can also become more severe, leading to a manic episode. The *DSM-IV-TR* criteria for a manic episode include the same number of symptoms as mentioned earlier for hypomania; however, the mood disturbance must last for one week (or involve hospitalization) compared to four days for hypomania. In addition, the mood disturbance must cause marked impairment in occupational functioning or in social activities (American Psychiatric Association, 2000). Women with a diagnosis of bipolar disorder are at an increased risk of developing a mood episode in the postpartum period. In fact, Yonkers et al. (2004) reported that the risk of hospital admission for a first mood episode increased by seven times in postnatal women compared to non-postnatal women. Similarly, postnatal women with bipolar disorder were twice as likely compared to non-pregnant women to experience a recurrent mood episode.

Postpartum psychosis is the most extreme version of postpartum mood disturbance. Postpartum psychosis is extremely rare, occurring in less than 0.2% of the population. It generally occurs in the first four weeks postpartum, although a recent study by Heron, McGuinness, Robertson Blackmore, Craddock, and Jones (2008) found that the modal day of onset for the first symptom of postpartum psychosis (generally feeling elated, more talkative than usual, or needing less sleep) was found on the first day postpartum, with symptoms escalating rapidly between days 3 and 7. Commonly reported symptoms include paranoid delusions, grandiosity, and sleep disturbance (Heron et al., 2008). Although the layperson may automatically connect postpartum psychosis to infanticide, only a very small number of women with postpartum psychosis go on to become aggressive. One study found that in a sample of women with postpartum psychosis, 35% of women were admitted to hospital due to safety concerns with incorrect handling of the infant, severe behavioural disturbance, or acting on delusions (Heron et al., 2008).

Postpartum psychosis is often a postpartum-onset mood disorder with psychotic features (American Psychiatric Association, 2000). However, the *DSM-IV-TR* also recognizes brief psychotic disorder with postpartum onset and psychotic disorder not otherwise specified, including postpartum psychosis that does not meet the criteria for mood disorder with psychotic features (American Psychiatric Association, 2000). Postpartum psychosis generally occurs in women with bipolar disorder, thus it is conceptualized as an episode of bipolar disorder with psychotic features (Sharma, Smith, & Mazmanian, 2006).

Although postpartum psychosis is rare, women who have a personal or family history of bipolar disorder are at an increased risk. Heron et al. (2008) found that in 25 to 50% of deliveries, women with a diagnosis of bipolar disorder experience an episode of postpartum psychosis. One study reported a recurrence rate of 90% for women who had a previous episode of postpartum psychosis in the past two years (Spinelli, 1998). The risk of relapse was found to be 8.6 times greater for women who did not receive any preventive treatment (e.g., lithium carbonate) compared to those women who did (Spinelli, 1998).

Bipolar women are at an increased risk for developing mood episodes during the postpartum period. For instance, in a study by Freeman et al. (2002), out of 30 mothers who had a *DSM-IV-TR* diagnosis of bipolar disorder, 20 (or 67%) experienced a postpartum mood episode. Furthermore, having a postpartum mood episode following a first pregnancy significantly increased the risk of having subsequent postpartum mood episodes after later child births. In fact, all women who experienced a postpartum mood episode following their first delivery experienced recurring mood episodes during the postpartum period after subsequent deliveries (Freeman et al., 2002). In addition, the majority of mood episodes were depressive (Freeman et al., 2002).

In a recent study conducted by Sharma, Khan, Corpse, and Sharma (2008), 56 women with a diagnosis of postpartum depression were interviewed with the Structured Clinical Interview for *DSM-IV* (SCID), the Highs Scale, and the Mood Disorder Questionnaire. The results revealed that the majority of participants (84%) experienced the baby blues. In terms of the onset of depression, 40% of the sample reported the symptoms beginning immediately after delivery, 20% said two days postpartum, 20%

said four weeks, and 20% said three months. In addition, 54% of the total sample had bipolar spectrum disorder (with the rest meeting criteria for major depression), but interestingly only 10% of patients with bipolar disorder had a previous bipolar diagnosis (Sharma et al., 2008). The majority of individuals diagnosed with bipolar disorder were given the diagnosis of bipolar disorder not otherwise specified (NOS; 29%), followed by bipolar II disorder (23%), and lastly bipolar I disorder (2%). In regards to the Highs Scale, 13% of participants scored above the cut-off, and 83% of those individuals were given a diagnosis of bipolar disorder and 17% received a major depressive disorder diagnosis. This study demonstrated that many women experiencing depressive symptoms in the postpartum may in fact have an undiagnosed bipolar spectrum disorder. Therefore, it is very important that women are assessed not only for depressive symptoms in the postpartum, but also for manic, hypomanic, or mixed symptoms.

Although the majority of the focus during the postpartum period goes toward depressive and hypomanic mood episodes, mixed episodes can also be present at this time. A mixed episode, according to the *DSM-IV-TR,* requires that an individual meet the full criteria for both a manic episode and a major depressive episode for a period of one week (Doran, 2008). A study conducted by Bauer, Simon, Ludman, and Unützer (2005) found that 94.1% of bipolar outpatients presenting in a hypomanic state also showed symptoms of major depression; however, only 17.6% of these individuals actually met the criteria for a mixed state according to the *DSM-IV-TR.* Similarly, 70.1% of bipolar patients presenting during a depressive episode also had simultaneous manic symptoms. In this study, Bauer et al. (2005) concluded that co-occurring hypomanic and depressive symptoms are twice as common as mixed episodes as defined by the *DSM-IV-TR.* This

study suggests that mixed states may be more common in the postpartum period than expected; however there is a scarcity of research regarding the prevalence of mixed states in the postpartum period and a great need for such research.

Is Postpartum Depression a Distinct Entity?

There is currently debate over whether postpartum depression is a distinct entity, or whether or not it is different from depression occurring at other times throughout the lifetime. The *DSM-IV-TR* includes "with postpartum onset" as a specifier describing features of the current depressive episode (American Psychiatric Association, 2000, p. 422). The *DSM-IV-TR* states that depression in the postpartum period is unique due to changes in hormones, psychosocial adjustments, and implications for having future children (American Psychiatric Association, 2000). However, the symptoms and recurrence rates of postpartum onset depression and non-postpartum onset depression are the same (American Psychiatric Association, 2000).

Typically the postpartum period is associated with an elevated risk of developing depression compared to other times in a woman's life. However, not all research has supported the notion that depression is more common after childbirth. For instance, Evans, Heron, Francomb, Oke, and Golding (2001) conducted a longitudinal study following women through pregnancy and into the postpartum period to observe the rates of depression. Depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS) at week 18 and 32 of pregnancy as well as week 8 and 8 months after childbirth. The results revealed the depression scores were higher at the 32nd week of pregnancy than at eight weeks postpartum, which suggests that depression may not be more common during the postpartum period than during pregnancy. Similarly, it

has also been found that up to 40% of women diagnosed with postpartum depression were also depressed during their pregnancy (Whiffen, 1991). Furthermore, Whiffen (1991) also argues that many of the risk factors for postpartum depression including marital problems and low levels of social support are the same risk factors for non-postpartum depression. Whiffen and Gotlib (1993) argue that the only difference between postpartum and non-postpartum depression is symptom severity, with depression after delivery being milder than non-postpartum depression.

Although there may be some debate about whether postpartum depression is a distinct entity, it is undeniable that the postpartum period is a period of particular vulnerability for mood episodes, ranging from the maternity blues through to postpartum psychosis. As mentioned earlier, the vast majority of women go on to experience the "blues", and bipolar women are at a highly increased risk for developing mood episodes during this period. Heron et al. (2008) found that during the first month postpartum women are approximately 22 times more likely to experience the onset of a manic or psychotic episode compared to any other time in their life. Clearly there is no debate that the postpartum period is a high risk period for women to experience mood episodes.

Another interesting question is whether postpartum depression differs from "bipolar" postpartum depression. Sharma (2005) defines "bipolar" postpartum depression as an episode of depression with postpartum onset in women who have a history of hypomania, or who later develop bipolar I, bipolar II, or bipolar spectrum disorder. Sharma presented preliminary data looking at a sample of 34 women with recurrent depression, with a history of onset of illness in the postpartum period. Twenty-seven of these women experienced major depression within the first four weeks following delivery

(the early onset group), compared to seven women who experienced depression after the first 4 weeks following delivery (the late onset group). Interestingly, 74% of those in the early onset group later met *DSM-IV* criteria for bipolar disorder (9 with bipolar I disorder, 10 with bipolar II disorder, and 1 with bipolar disorder NOS). Furthermore, none of the individuals from the late onset group went on to meet *DSM-IV* criteria for any type of bipolar disorder. Due to the small sample size, the seven participants in the late onset group were age-matched with seven participants from the early onset group. Again, 100% of the early onset group met *DSM-IV* criteria for bipolar disorder, compared to 0% in the late onset group (Sharma, 2005). Therefore, it is hypothesized that early onset postpartum depression and late onset postpartum depression may be separate entities, and that earlier onset postpartum depression may be linked to a bipolar diathesis.

Gonadal Steroids and Mood

At the end of the third trimester of pregnancy, estradiol levels increase 50-fold over the maximum menstrual cycle levels, and then fall back to early follicular phase levels within 1 to 3 days postpartum (Bloch, Daly, & Rubinow, 2003). Similarly, progesterone levels increase 10-fold over the maximum menstrual cycle levels, and then fall back to follicular levels between day 3 and 7 postpartum (Bloch et al., 2003). Due to these profound hormone changes that occur immediately after delivery, a link has been proposed between gonadal steroids (or sex hormones) and mood in the etiology of postpartum depression (Steiner et al., 2003).

Bloch et al. (2000) used a hormone regimen which simulated pregnancy and the postpartum period. Participants were divided into the postpartum depression (PPD) group and a comparison group. The PPD group consisted of eight women with a current history

of psychiatric illness and at least one past episode of PPD. Meanwhile, the comparison group consisted of eight women without previous or current psychiatric illness (Bloch et al., 2000). After a baseline period, high levels of estradiol and progesterone were given to participants. In the withdrawal phase, active medications were replaced by placebos, which led to a drop is plasma estradiol and progesterone levels. Hypogonadal levels were sustained for a four-week withdrawal period by leuprolide. Women were then followed for another eight weeks without medication. The Beck Depression Inventory (BDI) and the EPDS were given to participants twice a month to assess their mood and behavioral symptoms (Bloch et al., 2000). The results revealed a significant increase in mood symptoms among the PPD group in the withdrawal phase compared to the control condition. These findings lend support for the role of estrogen and progesterone in the onset of postpartum depression.

As discussed above, beginning at puberty and continuing throughout their reproductive lives, women are twice as likely to develop major depressive disorder compared to men. Research has shown that estrogen appears to play a large role in increasing the risk of developing mood disorders. More specifically, sudden estrogen withdrawal (e.g., postpartum period), fluctuating estrogen levels (e.g., puberty, PMS, and perimenopause), and low estrogen levels or a sustained estrogen deficit (e.g., menopause) are all significantly correlated with mood disturbance (Douma et al., 2005).

Estrogen is believed to enhance mood by increasing the amount of serotonin available at the synapse. More specifically, estrogen decreases the levels of monoamine oxidase, which is an enzyme responsible for breaking down neurotransmitters such as serotonin and dopamine, as well as affecting intraneuronal serotonin transport (Douma et

al., 2005). With high estrogen levels, these chemicals can circulate and elevate mood. Estrogen also affects neurotransmitters in the hypothalamus which regulate temperature and sleep. Not only does estrogen modulate serotonin function, it also can alter dopaminergic, cholinergic, GABAergic, and glutamatergic neurotransmitters. Low levels of estrogen or estrogen fluctuations may induce the development of a mood episode (Douma et al., 2005).

The role of estrogen in depression is furthered supported through research showing successful use of estrogen therapy to treat postpartum, perimenopausal, and postmenopausal depression (Douma et al., 2005). Estradiol is typically used for treatment since it is the principal form of estrogen that circulates in the body from menarche through to menopause (Douma et al., 2005).

A study by Ahokas, Kaukoranta, Wahlbeck, and Aito (2001) found support for estradiol as a treatment for postpartum depression. This study involved 23 women who were diagnosed with major depression with postpartum onset. Serum estradiol levels were measured at baseline, followed by weekly measurements for eight weeks while receiving estradiol treatment. In addition, depression scores were monitored weekly using the Montgomery-Asberg Depression Rating Scale (MADRS). At baseline, all women had low serum estradiol concentrations and were severely depressed ($M = 40.7$). Following one week of treatment, there was a significant decrease in depressive symptoms ($M =$ 11.0). Serum estradiol concentrations were similar to the levels found during the follicular phase of the menstrual cycle. Following two weeks of estradiol treatment, 19 out of 23 patients had MADRS scores consistent with recovery from depression. Finally, at week eight of treatment, all of the women had depression scores equal to or less than

seven. Thus, this study supports the use of estrogen replacement as a treatment for postpartum depression.

Depression during perimenopause has been associated with fluctuating estrogen levels (Douma et al., 2005). The use of estrogen replacement during this period has been shown to be an effective antidepressant. De Novaes Soares et al. (2001) examined the benefit of transdermal 17β-estradiol in the treatment of depression in perimenopausal women. Women included in this study were between the ages of 40 and 55, had experienced menstrual cycle irregularity for less than one year, and had a diagnosis of either major depressive disorder, minor depressive disorder, or dysthymic disorder. Fifty women were randomly assigned to either transdermal estradiol patches or placebo patches for 12 weeks. The MADRS and the Blatt-Kupperman Menopausal Index (BKMI) were used monthly to assess depressive symptoms and perimenopausal somatic symptoms (e.g., hot flashes, sleep disturbance, and joint pain). At the end of the treatment period, the results revealed that the mean MADRS scores were significantly lower in the women treated with estradiol compared to placebo. Also, remission of depression was observed in 68% of the estradiol group compared to 20% of the placebo group. Furthermore, participants were followed for 4 weeks after treatment, and the estradiol group sustained their antidepressant effect, although the somatic complaints returned. Therefore, estradiol was demonstrated to be an effective antidepressant treatment for perimenopausal women.

Estrogen has also shown antidepressant effects in postmenopausal women. In a study by Carranza-Lira and Valentino-Figueroa (1999), twelve postmenopausal women with depression were split into two groups and received either estrogen replacement

therapy or no treatment for six months. Mood ratings were assessed using the Hamilton Rating Scale for Depression (HRSD) at baseline and then again six months later. The results revealed a significant decrease in HRSD scores for the estrogen replacement therapy group (21 point decrease) compared to the control group (13 point decrease). In addition, final scores on the HRSD were significantly lower for the estrogen replacement therapy group compared to the control group. Therefore, estrogen replacement therapy had a significant antidepressant effect after six months of treatment.

Other gonadal hormones, such as progesterone, have also been implicated in the etiology of postpartum depression. Ingram, Greenwood, and Woolridge (2003) found that lower levels of progesterone after delivery predicted the development of depression six months later. However, other studies have not found any differences between progesterone levels of depressed and non-depressed women (O'Hara, Schlechte, Lewis, & Varner, 1991). Studies examining oral contraceptives have implicated progesterone, in addition to estrogen, in affecting mood stability. Higher progesterone to estrogen ratios in oral contraceptives have been associated with lower negative mood change in women who have a history of premenstrual symptoms (see review by Oinonen & Mazmanian, 2002). Furthermore, women without a history of premenstrual irritability have a lower risk of negative mood change with low ratios of progesterone to estrogen (Oinonen & Mazmanian, 2002). Thus, progesterone also seems to play a role in mood change and possibly in the etiology of postpartum depression.

Predictors of Postpartum Depression

A number of demographic, reproductive, and psychosocial variables have been found to be associated with the increased risk of developing postpartum depression.

Demographic variables such as age, marital status, and education have been associated with postpartum depression. For instance, Paykel, Emms, Fletcher, and Rassaby (1980) surveyed 120 women from post-natal clinics and found that 20% of women met the criteria for mild depression. Depressed women were found to be significantly younger (M = 24.1) than non-depressed women (M = 27.9). However, Goodwin, Jacobi, Bittner, and Wittchen (2006) reported the late 20s as the mean age for the first onset of depression (e.g., 27.4). In addition, Lane et al. (1997) found that scores above cut-off on the EPDS were significantly correlated with failure to obtain school qualifications and single status. Lower levels of education could lead to a lower socioeconomic status, which has been shown to be associated with increased rates of depression (Goodwin et al., 2006). Goodwin et al. (2006) also reported that higher rates of depression and bipolar disorder were found in women who had never been married or were previously married compared to women who are currently married.

A consistent finding in the literature is the impact of previous psychiatric history on postpartum depression. Watson, Elliott, Rugg, and Brough (1984) identified a significant association between previous psychiatric history and postpartum depression. In their study, 15 women out of 128 were diagnosed with postpartum depression, and 9 of the 15 women had a previous psychiatric history, and three women were depressed during their pregnancy. Nielsen Forman, Videbech, Hedegaard, Dalby Salvig, and Secher (2000) found that a history of psychiatric illness increased the risk of developing postpartum depression and Lane et al. (1997) found that past psychiatric history was associated with higher scores on the EPDS. In addition, a positive family history of

depression has also been shown to increase the risk of developing postpartum depression (Stowe & Nemeroff, 1995).

As described earlier, there is a strong association between mood and reproductive events, with younger age at menarche, irregular menstrual cycles and menstrual flow, PMS symptoms, and PMDD being linked to postpartum depression. Previous childbirths, unplanned pregnancy, pregnancy complications, history of abortion, and history of miscarriage are additional reproductive variables which have been linked to postpartum depression.

Nielsen Forman, Videbech, Hedegaard, Dalby Salvig, and Secher (2000) found that having multiple childbirths increased the risk of developing postpartum depression. Lane et al. (1997) found that scores above the cut-off on the EPDS were significantly associated with unplanned pregnancy. In addition, pregnancy complications, as well as having had an abortion or miscarriage have been associated with an increased risk of developing postpartum depression. Josefsson et al. (2002) examined obstetric risk factors of postpartum depressive symptoms. The EPDS was used to identify a group of 132 women with postpartum depressive symptoms as well as a control group consisting of 264 women. The results of this study showed that women who had previously had two or more abortions and a history of obstetric complications, such as Caesarean section and instrumental delivery, were significantly more likely to develop postpartum depressive symptoms. Pregnancy complications, such as premature contractions, were more common in the depressed women than in the non-depressed women. Depressed women took sick leave more frequently and visited antenatal care clinics more often than non-

depressed women, and these two variables were the strongest risk factors for postpartum depressive symptoms.

With the birth of an infant, the postpartum period can bring with it a series of new changes and stressors. Many psychosocial variables have been associated with the potential development of postpartum depression, including perceived stress, perceived marital satisfaction, negative life events, perceived social support, the overall health of the infant, difficulty managing the infant, bottle or breastfeeding, bond with infant, and sleep disturbance.

Gotlib, Whiffen, Wallace, and Mount (1991) asked a total of 730 women to complete a series of questionnaires including the Schedule for Affective Disorders and Schizophrenia (SADS), the BDI, the Dyadic Adjustment Scale (DYAS), the Ways of Coping Checklist (WCC), and the Perceived Stress Scale (PSS). These measures were completed in the sixth month of pregnancy and four and a half weeks after delivery. Women were divided into a non-depressed group (n = 655) and a minor or major postpartum depression group (n = 75). Depressed women reported significantly higher levels of perceived stress during pregnancy, lower levels of satisfaction with their marriages, and a higher use of escape-avoidance coping. Of the women with depression, 72% had recovered by the time of the last assessment. The variables that significantly distinguished between recovered women and non-recovered women were less perceived stress, greater marital satisfaction, perceiving infants as less bothersome, less escape-avoidance coping during the post-partum period, and greater confrontation skills. The results of this study show the importance of perceived stress and relationship satisfaction and how these psychosocial factors can impede the recovery of postpartum depression.

Paykel et al. (1980) examined the effects of life events and social support in postpartum depression. One-hundred and twenty women visiting post-natal clinics were assessed using the Raskin Three Area Depression Scale, the Interview for Recent Life Events, and a personal history and background questionnaire. Twenty-four women were diagnosed with mild clinical depression. The results revealed that 68% of depressed women experienced an undesirable event of moderate to severe negative impact in the past 10 months, as compared to 35% of non-depressed women. Depressed women rated their pregnancy as significantly more stressful than non-depressed women and rated the help they received from their husbands and their communication with their husbands significantly lower than non-depressed women. Furthermore, depressed women rated the adequacy of their housing and the adequacy of a confidant lower than non-depressed women. Similarly, Nielsen Forman et al. (2000) found that feelings of social isolation increased the risk of developing postpartum depression.

The Postpartum Depression Predictors Inventory is a checklist which is made up of risk factors which have been found to be associated with postpartum depression through a recent meta-analysis (Beck, 2002). Social support, life stress, marital status, socioeconomic status, marital satisfaction, maternity blues, and history of previous depression were all identified risk factors which have already been discussed. However, child care stress (infant is experiencing health problems) and infant temperament (or having an irritable or fussy baby which is difficult to console) and having an unwanted or unplanned pregnancy were also found to be predictors of postpartum depression with small to medium effect sizes (Beck, 2002).

The positive effects of breastfeeding in reducing depressive symptoms in the postpartum period have been observed in several studies. Yonkers et al. (2001) found that women who breastfed their babies were significantly less likely to have depressive symptoms or major depressive disorder, as measured by the EPDS and the Inventory of Depressive Symptomatology. Similar results were observed by Harlow et al. (2004), who found that the risk for developing postpartum depression increased as the total number of months spent breastfeeding decreased. Breastfeeding is thought to increase positive feelings toward the infant and thus enhance the mother-infant bond. Alternatively, the effect of breastfeeding could be hormonal in nature. Breastfeeding may help to prevent depression by prolonging the withdrawal of prolactin (Sharma & Corpse, 2008). The cessation of breastfeeding has been linked to the development of depression in some women (Sharma & Corpse, 2008). However, the exact nature of the relationship between breastfeeding and depression is not well understood.

The mother-infant bond, or early attachment between mother and child, may be at risk for women with postpartum depression. A study by Taylor, Atkins, Kumar, Adams, and Glover (2005) examined bonding between mother and infant and how it related to early maternal mood. The Mother to Infant Bonding Scale (an eight-item self-rating scale) was created for the purpose of the study to measure the mother's feelings toward her infant. On the third day postpartum, 162 women filled out the Kennerley Blues Scale, the EPDS, and the Mother to Infant Bonding Scale. The depression and bonding scales were completed again 12 weeks later, and there was a strong correlation between bonding scores at the two points in time. The main finding of this study was that women who scored higher on the EPDS and Blues Scale at day three postpartum showed lower

bonding ratings, suggesting that "the blues" as well as postpartum depression may interfere with mother-infant bonding as early as day three postpartum, or women who are less "maternal" (i.e., women who naturally bond less with kids) may be at greater risk for developing postpartum blues.

The transition from pregnancy into the early postpartum period is associated with sleep disruption (Sharma & Mazmanian, 2003). Sleep disruption in the postpartum period is common due to frequent baby awakenings, crying, and night-time feedings. Lee, Zaffke, and McEnany (2000) found that compared to the third trimester of pregnancy, in the first month postpartum, women had significantly less total sleep time and poor sleep efficiency due to frequent awakenings at night. Furthermore, this difference was especially prominent in first-time mothers. Similarly, Shinkoda, Matsumoto, and Park (1999) also found shorter sleep efficiency and an increase in wake time during the night in the fifth week postpartum compared to the 34^{th}-37^{th} week of pregnancy. Breastfeeding was a common reason for the disruption in the sleep wake cycle (Horiuchi & Nishihara, 1999; in addition, Shinkoda et al., 1999).

Wilkie and Shapiro (1992) examined the role of sleep deprivation during labour to see if night time deliveries increased the risk of developing of the "blues". The results revealed that the group who had a night labour obtained higher mood scores (or more distress) on 8 out of 9 days. The largest difference was found between day 3 and 5, where symptoms of the blues are thought to peak. In addition, greater sleep disruption in the third trimester of pregnancy was significantly associated with higher ratings of blues symptoms in the first nine days postpartum.

In the depression literature, a night of total sleep deprivation has been found to

lead to a marked decrease in depressive symptoms, although this typically is a very short-lived effect and relapse can occur even after a short nap (Buysse, Germain, Nofzinger, & Kupfer, 2006). Wu and Bunney (1990) reviewed 61 papers and found an average of 59% of patients showed a marked antidepressant effect of one night of total sleep deprivation, with no difference found between patients with unipolar or bipolar depression. However, the relationship between sleep and depression seems to be contradictory, since insomnia is also a symptom of depression and sleep disturbance has been found to be a risk factor for the onset of depression (Buysse et al., 2006). Sleep deprivation over a longer period of time seems to have very different effects than one night of total sleep deprivation.

Sleep deprivation in the postpartum period has recently been examined as a potential predictor of postpartum depression. A study by Dennis and Ross (2005) had 505 women complete the EPDS, and those with a score above 12 (higher scores indicate low mood) during the first week postpartum were asked to complete questionnaires at week 5 and 8 postpartum. Women with scores above the cut-off score were significantly more likely to report that their baby cried often, that they were woken up three or more times between 10:00 p.m. and 6:00 a.m. and that they received less that six hours of sleep in a 24-hour period during the last week, and that they often felt tired (Dennis & Ross, 2005). The same women were three times more likely to report that their baby did not sleep well and six times more likely to report that, due to their babies sleep pattern, they were unable to get a reasonable amount of sleep compared to women who scored below the cut-off on the EPDS. Therefore, although most women experience sleep disturbance in the postpartum period, the severity of this disturbance seems to predict the development of postpartum depressive symptoms.

Due to evidence of sleep disruption in the first month postpartum, another variable which has recently been associated with postpartum depression is postpartum fatigue. Corwin, Brownstead, Barton, Heckard, and Morin (2005) hypothesized that women who reported severe fatigue in the first two weeks postpartum were more likely to develop depressive symptoms at one month postpartum compared to women who did not report such fatigue. Forty-two women were recruited before their 36th week of pregnancy and followed into the postpartum period. Postpartum fatigue was measured with the Modified Fatigue Symptom Checklist (MFSC), stress levels were measured with the Perceived Stress Scale (PSS), and depressive symptoms were measured with the Center for Epidemiological Studies-Depressive Symptomatology Scale (CES-D). These three measures were taken on the 36th and 38th week of pregnancy, as well as day 7, 14, and 28 after delivery. At each time, the perceived levels of fatigue and stress were significantly correlated with depressive symptoms. Postpartum fatigue at day 14 was the best predictor of depressive symptoms at one month postpartum. The problem with this finding is that postpartum fatigue is clearly related to changes in sleep patterns, which is a symptom of depression. Therefore, it would not be unexpected for the presence of an early symptom of depression to predict the later development of depression.

Predictors of Postpartum Elation or Hypomania

Glover et al. (1994) were some of the first researchers to examine the occurrence of elation or hypomania in the postpartum period. Two hundred and fifty-eight women were approached on the third day after delivery and agreed to participate in the study. The EPDS and the Highs Scale were administered on days 3 and 5 postpartum as well as the sixth week postpartum. The Highs Scale is a seven item questionnaire that measures

elation and was created using the Schedule for Affective Disorders and Schizophrenia-Lifetime Version (SADS-L) criteria for hypomania. The results of this study revealed that during the first week after delivery, approximately 11% of women met the criteria for hypomania as indicated by a score greater than eight on the Highs Scale. Furthermore, the majority of women no longer met this criterion by the sixth week postpartum. In addition, elevated scores on the Highs Scale on the third day postpartum led to a 50% increase in risk for developing later depression as measured by an EPDS score greater than 10, or a 22% risk of having an EPDS score greater than 13. Thus, postpartum hypomania or elation appears to be more common than hypomania that occurs in times other than childbirth, which has a lifetime prevalence of 0.5% (Judd & Akiskal, 2003). However, the lifetime prevalence of subsyndromal manic and hypomanic symptoms is much higher at 5.1%, which includes individuals who experienced two simultaneous manic symptoms but failed to meet criteria for a manic or hypomanic episode (Judd & Akiskal, 2003).

A similar study by Lane et al. (1997) examined both depression and elation in the postpartum period. New mothers were asked to complete the EPDS and the Highs Scale on day three postpartum as well as six weeks postpartum. Clinical and obstetric data were collected and mothers were given a questionnaire assessing a variety of psychosocial variables. Scores above the cut-off point on the Highs Scale were significantly associated with single status, unplanned pregnancy, and bottle-feeding. Furthermore, the Highs and EPDS scales were significantly positively correlated. The mother's mood state at day three postpartum was the best predictor of depression at six weeks. This study illustrates that both elation and depression are common following childbirth and that these two states are interrelated.

The predictors of postpartum elation or hypomania have not been well studied, but they appear to be similar to the predictors of postpartum depression. As mentioned previously, single status, unplanned pregnancy, and bottle-feeding were all found to be predictors of postpartum elation but have also been found to be predictors of postpartum depression.

Similarly, sleep disruption is a variable implicated in the development of postpartum depression, which is also linked to the development of postpartum elation and psychosis. Insomnia has been found to occur in between 42 and 100% of patients with postpartum psychosis (Sharma & Mazmanian, 2003). In addition, sleep deprivation has been found to precipitate mania or hypomania in some patients with bipolar disorder (Buysse et al., 2006). Wu and Bunney (1990) reviewed 10 studies and found that 30% of 29 patients with bipolar depression became either manic or hypomanic after a night of total sleep deprivation, and 25% of 85 patients with unspecified depression (unipolar or bipolar) became manic or hypomanic. In a study by Leibenluft, Albert, Rosenthal, and Wehr (1996), patients with rapid-cycling bipolar disorder were followed longitudinally for 18 months to examine the relationship between sleep and mood. For 5 out of 8 patients there was a significant effect of sleep duration on mood ratings for the next day. In other words, an increase in sleep duration lowered the probability of a manic or hypomanic episode occurring. Earlier wake onset was also associated with an increased probability of mania or hypomania occurring the next day.

Lastly, postpartum elation or hypomania has been hypothesized to be related to the attachment between the mother and the infant (Heron et al., 2005). Women with postpartum hypomania have been found to express a stronger bond with their infant,

which can last as long as one year (Heron et al., 2005). Thus, this theory would suggest that postpartum elation may be beneficial from an evolutionary perspective if it promotes early attachment that may later be threatened by the development of postpartum depression (Heron et al., 2005).

Postpartum elation or hypomania may be overlooked by health care workers as simply a normal joy reaction to having a child (Heron et al., 2005). However, early detection of postpartum hypomania may be extremely beneficial in order to determine if individuals are at later risk of developing postpartum depression or other mood episodes (e.g., manic or mixed states).

The Present Study

Although many variables have been identified as potential risk factors for the development of postpartum depression, the risk factors for postpartum elation or hypomania have been researched to a much lesser extent. It is not clear whether postpartum depression and elation represent the same underlying phenomenon expressed differently depending on genetic predispositions or environmental factors, or whether the two constructs are independent entities. Whether or not postpartum depression and elation are associated with the *same* risk factors or *different* risk factors may help to answer this question. Furthermore, a more comprehensive approach is needed where both the biological and reproductive variables are considered in combination with the psychosocial variables. These factors do not work in isolation, but need to be examined together. There have been no studies to date which have examined an exhaustive list of both biological and psychosocial factors as potential risk factors for postpartum depression as well as postpartum elation.

Mood in the postpartum period can be measured in a variety of ways, with a number of different scales including the EPDS, BDI, MADRS, Raskin Three Area Depression Scale, Quality of Life in Depression Scale, and the Inventory of Depressive Symptomatology to name a few. Although the BDI is the most commonly used measure of depression, it may not be content-specific to postpartum depression. For example, in one study, only 11 of 19 women who scored above the BDI cut-off score actually met the diagnostic criteria for depression. Furthermore, of the 23 people who scored below the cut-off score, 4 were false negatives (O'Hara, Rehm, & Campbell, 1983).

The EPDS consists of ten items which are rated on a 4-point scale resulting in a score from 0 to 30, with high scores indicating low maternal mood (Dennis & Ross, 2005). This scale is not sufficient to diagnose postpartum depression, but it is used to screen mothers who are at risk for developing the disorder (Dennis & Ross, 2005). A score of 12 or 13 is used as a cut-off score to indicate that someone is likely to be suffering from depression (Cox, Holden, & Sagovsky, 1987). The sensitivity of this measure ranges from 68 to 85%, and the specificity ranges from 78 to 96% when compared to a diagnosis established through a diagnostic interview (Cox et al., 1987). Furthermore, it demonstrates good predictive power, with significant correlations between mood at 5 days and then at 5 weeks postpartum. Women who scored above nine on this scale at 5 days postpartum were eight times more likely to score above nine again at 6 weeks postpartum, compared to those who scored below nine (Cox et al., 1987). Furthermore, the split-half reliability was found to be .88. The EPDS has also been validated for computer administration. In a recent study by Spek, Nyklicek, Cuijpers, and Pop (2008), the computer administered version of the EPDS was found to have good

internal consistency (Cronbach's alpha = .87). In addition, the computerized versions of the EPDS and BDI were significantly correlated (r = .75), and the correlation was similar to paper and pencil correlations between the two measures (Spek et al., 2008).

The focus of the present study was predicting mood change, in both the positive and negative direction. Specifically, a combination of demographic and psychiatric history, reproductive, and psychosocial variables were examined to predict both postpartum depression and postpartum elation. Depression was measured using the BDI-II and the EPDS, and elation was examined using the Highs Scale as well as an elation scale developed solely for the purpose of this study. In addition, mood was measured on a continuum from high mood to low mood using the composite mood scale, which will be explained later in greater detail.

The present study was a prospective design where women were first assessed in the first week postpartum and then again one month later. Questionnaires were completed at the two time intervals and measured demographic variables (i.e., current age, educational status, and marital status), psychiatric history (i.e., personal history of mental illness and family history of mental illness), reproductive variables (i.e., age at menarche, period regularity, duration of menstrual period, PMS symptoms, number of times pregnant, whether or not the pregnancy was planned, abortions, miscarriages, and pregnancy complications), and psychosocial variables (i.e., perceived social support, perceived marital satisfaction, negative life events, perceived stress, breast/bottle-feeding, sleep problems, degree of bond with the infant, overall health of the infant, and difficulty of managing the infant). These variables were then used in a regression analysis to

determine the extent to which they contribute unique variance, or were significant predictors of various measures of mood.

In terms of the demographic and psychiatric history variables, it was hypothesized that women with higher depression scores would be younger, single, have less education, and have a positive history of previous personal and family mental illness. These predictions are based on findings from past literature, as mentioned above.

In terms of the reproductive variables, it was hypothesized that women with higher depression scores would have experienced menarche at a younger age, have had irregular menstrual periods, experienced PMS symptoms, had previous childbirths, had an unplanned pregnancy, had an abortion or miscarriage, and experienced pregnancy complications. The majority of these variables have been tested in associated with depression, but are not linked specifically to postpartum depression.

In terms of the psychosocial variables, it was hypothesized that women with higher depression scores would be more likely to experience a lack of perceived social support, perceived marital dissatisfaction, a high number of negative life events, and a high stress score. In addition, women who bottle-fed their infant, had lower ratings of bond with their infant, experienced sleep problems, experienced infant health problems, and had difficult-to-manage infants were hypothesized to have higher depression scores. These predictions are based on previous findings as discussed earlier.

It was hypothesized that individuals with higher elation scores would have experienced sleep disturbance, be of single status, had an unplanned pregnancy, bottle-fed their infant, and had a strong bond with their infant. It was also hypothesized that women who experienced postpartum elation would be at greater risk for later developing

postpartum depression. These predictions are based on previous literature, although these variables have not been examined concurrently in one study.

Finally, the hypotheses for the composite mood scale were the same as those listed above for depression and elation scores. It was expected that composite mood scale findings would be similar to those for depression and elation scores separately, thus showing that depression and elation can be measured continuously in addition to categorically.

Method

Participants

A sample of women located in Thunder Bay and across Canada was recruited to participate in this study. Participants had to be over the age of 18 to participate in this study. The age of participants ranged from 22 to 40 years of age. Participants were recruited through advertisements in local newspapers, the distribution of brochures, and discussion of the study in various prenatal health programs run by the Thunder Bay Regional Health Sciences Centre (see Appendix A for the recruitment brochure). For participating in this study, participants were entered in a random draw for the chance to win one of two $50 gift certificates for the Intercity Mall, or for Wal-Mart for those individuals residing outside of the Thunder Bay area.

Of the women informed about the current study, 33 participants completed the immediate postpartum questionnaire and 19 completed the follow-up questionnaire. The mean interval between completion of the first questionnaire and the second questionnaire was 29.1 days. In Week 1, 31 participants completed the online version of the questionnaire and two participants completed the paper and pencil version. In Week 5, 18

participants completed the online version of the questionnaire and one participant completed the paper and pencil version.

All participants were female and the majority described their ethnicity as Caucasian (97%). The age of participants ranged from 22 to 40 years of age ($M = 29.0$ years, $SD = 5.0$). The provinces represented in the sample included Nova Scotia (9.4%), Ontario (87.5%), and British Columbia (3.1%). Approximately 65.9 % of the sample was currently living in the local Thunder Bay (ON) area. At Week 1 postpartum, the majority of participants (51.5%) were on maternity leave and the majority of individuals worked full time (57.6%). The majority of the sample reported their highest level of education as having received an undergraduate degree (48.5%). See Table 1 for a summary of the demographic characteristics of the sample. This study was approved by the Lakehead University Research Ethics Board as well as the Thunder Bay Regional Health Sciences Centre Research Ethics Board.

Materials

A covering letter (see Appendix B) and consent form (see Appendix C) were distributed to participants prior to completion of the questionnaire. The initial questionnaire can be seen in Appendix D and the follow-up questionnaire can be seen in Appendix E. Upon completion on the questionnaire, a debriefing form was administered (see Appendix F).

Background Information Questionnaire

This scale was developed specifically for this study and its content is based on previously published material assessing demographic variables and prior reproductive history. It also incorporates information that is relevant to personal and family history of

Table 1

Demographic Characteristics of the Overall Sample

Variable		Week 1 ($N = 33$)		Week 5 ($N = 19$)	
		n	*(%)*	*n*	*(%)*
Age (in years)*		29.33	4.90		
Marital status	Married/common law	31	93.94	16	84.21
	In a long-term relationship	2	6.06	2	10.53
	Divorced/separated	0	0.00	1	5.26
Ethnicity	Caucasian/White	32	96.97		
	African-Canadian/Black	1	3.03		
City of residence	Thunder Bay, ON Region	21	65.57		
	Barrie, ON	1	3.13		
	Brantford, ON	1	3.13		
	Dryden, ON	1	3.13		
	Marathon, ON	1	3.13		
	Orillia, ON	1	3.13		
	Perth, ON	1	3.13		
	Smith Falls, ON	1	3.13		
	Bridgewater, NS	1	3.13		
	Clarks Harbour, NS	1	3.13		
	Port Williams, NS	1	3.13		
	Prince George, BC	1	3.13		
Employed	Yes	7	21.21	2	10.53
	No	9	27.27	5	26.31
	Maternity leave	17	51.52	12	63.16
Overall employment	Full-time	19	57.58	10	52.63
	Part-time	2	6.06	1	5.26
	Student	3	9.09	5	26.32
	Stay at home parent	9	27.27	2	10.53
	Disability Pension	0	0.0	1	5.26
Education	Some high school	0	0.00		
	High school diploma	4	12.12		
	Some college	1	3.03		
	College diploma	6	18.18		
	Some university	1	3.03		
	Undergraduate degree	16	48.49		
	Master's degree	4	12.12		
	Doctorate Degree	1	3.03		

Note. * = Variables that use *M* and *SD* instead of *n* (%). This table includes missing data due to unanswered items. Age, ethnicity, city of residence, and education were not assessed at Week 5 and are therefore not presented.

mental illness (see Appendix D).

Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987)

The EPDS is a 10 item scale which can be completed in less than five minutes. Items on this measure are rated on a 4-point scale resulting in a score from 0 to 30. High scores indicate low maternal mood. A cut-off score of 12 or 13 is used to indicate that someone is likely to be suffering from depression (Cox et al., 1987). The sensitivity of this measure ranges from 68 to 85%, and the specificity ranges from 78 to 96% when compared to a diagnosis established through a diagnostic interview (Cox et al., 1987). Furthermore, it demonstrates good predictive power, with significant correlations between mood at 5 days and then at 5 weeks postpartum. Women who scored above nine on this scale at 5 days postpartum were eight times more likely to score above nine again at 6 weeks postpartum, compared to those who scored below nine (Cox et al., 1987). Furthermore, the split-half reliability was found to be .88.

Due to ethical concerns, the question regarding self-harm or suicidal ideation (item 10) was removed from the questionnaire. The average score for the remaining items was used as the score for item 10, so not to strongly affect the overall score on the inventory.

The Dyadic Adjustment Scale (DYAS; Spanier, 1976)

The DYAS is a 32-item self-report questionnaire that measures the quality of marital relationships. The DYAS has a theoretical range of scores from 0 to 151, with a higher score indicating a higher quality relationship. This scale was validated using the criterion of marital status, with the scale being administered to both a group of married and divorced individuals (Spanier, 1976). The mean score on the scale was 101.5, but

there was a significant difference between the total score for individuals with a married status (114.8) and those with a divorced status (70.7). Factor analysis revealed four related components: dyadic satisfaction, dyadic cohesion, dyadic consensus, and affectional expression, which make up the four subscales on this measure (Spanier, 1976). The internal consistency reliability of the total scale score using Cronbach's Coefficient Alpha was found to be .96 (Sharpley & Cross, 1982).

Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983)

The PSS is a 14-item self-report inventory which measures the extent to which certain situations in a person's life are appraised as stressful. Items on this measure are rated on a 4-point scale resulting in a score from 0 to 56, with higher scores indicating a greater level of perceived stress. This scale measures the unpredictability, uncontrollableness, and overloading experienced in an individual's life. The PSS assesses an individual's thoughts and feelings during the last month, so the time frame for this scale was changed to the last week to ensure consistency with the other scales. The pooled internal consistency reliability of the PSS is .85 for a combination of three samples. The test-retest reliability is .85 within two days and only .55 for six weeks. However, the PSS is a state measure and is expected to change over time due to new life experiences. The PSS has strong predictive validity as it can predict depressive and physical symptomatology, as well as the utilization of health services five weeks after completion of the scale (Cohen et al., 1983).

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988)

The MSPSS is a 12 item self-report inventory, in which each question is rated on

a 7-point Likert scale ranging from *very strongly disagree* (1) to *very strongly agree* (7). This scale assesses the subjective adequacy of social support from family, friends, and a significant other. The total score is made up of the sum of the three subscale scores, and a higher total score represents a greater degree of perceived social support. The internal consistency reliability for the total scale is .88, and for the significant other, family, and friends subscales, it is .91, .87, and .85 respectively. The test-retest reliability for the total scale is .85, and for the significant other, family, and friends subscales, it is .72, .85, and .75 respectively. Perceived support from the family subscale was significantly negatively correlated with symptoms of depression and anxiety. Women report greater social support from friends and a significant other compared to men.

Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996)

The BDI-II is a self-report instrument containing 21 items, designed to measure the severity of depressive symptoms. The original version of this instrument (BDI; Beck & Steer, 1987) was revised to include the atypical symptoms of depression including hypersomnia and increased appetite. Each item on the inventory is rated on a 4-point scale from 0 to 3. Thus, the scores on this instrument can range from 0 to 63. Scores in the 0-13 range represent minimal depressive symptoms, scores from 14-19 represent mild depressive symptoms, scores from 20-28 represent moderate depressive symptoms, and scores from 29-63 represent severe depressive symptoms (Beck et al., 1996). The BDI has been used extensively in the past 35 years and is a very reliable instrument. The internal consistency reliability for the BDI- II is .92 for outpatients and .93 for college students, which is higher than for the original BDI. Test-retest reliability for 26

outpatients tested one week apart was .93. The BDI-II was validated against the original BDI and the correlation between the two measures was .93.

Due to ethical concerns, the question regarding suicidal thoughts or wishes (item 9) was removed from the questionnaire. The average score for the remaining items was used as the score for item 9, so not to strongly affect the total score on the inventory.

Postpartum Depression Predictors Inventory-Revised (PDPI-R; Beck, 2002)

The PDPI-R includes 39 questions, the majority having "yes" or "no" answers, except for the socioeconomic status and marital status questions. Answers are scored as either a 0 for "no" or a 1 for "yes". Total scores range from 0 to 39, and a cut-off score of 10.5 is typically used to suggest possible depression and that a follow-up is needed (Records, Rice, & Beck, 2007). The internal consistency reliability of the PDPI-R was found to be .83 for the total scale (Records et al., 2007).

The PDPI-R measures 13 risk factors found to be associated with postpartum depression through meta-analyses. These include prenatal depression, childcare stress, life stress, social support, prenatal anxiety, marital satisfaction, history of previous depression, infant temperament, maternity blues, self-esteem, socioeconomic status, marital status, and unwanted or unplanned pregnancy. Questions from the PDPI-R assessing unplanned or unwanted pregnancy, life stress, child care stress, and infant temperament were used in the current study.

Infrequency Scale from the Personality Research Form (PRF; Jackson, 1984)

Eight items from the Infrequency Scale of the PRF were used throughout the questionnaire as a validity check. The PRF was created by Jackson in 1967 and has 22 scales measuring normal personality dimensions (Murphy & Davidshofer, 2005). The

Infrequency Scale was designed to identify careless or non-purposeful responding, confusion, language difficulties, or lying. Items on this scale have a clear answer, for example "I have never ridden in an automobile" and "Things with sugar usually taste sweet to me." If a participant responded true to the first question and false to the second question, these would be considered infrequent responses.

Sleep Questions

Questions assessing sleep disturbance in the questionnaire were based on questions used in a study by Dennis and Ross (2005). Women were asked the following questions adapted from Dennis and Ross: how well their baby slept, which was rated on a scale from *very well* (1) to *very poorly* (5); how many hours of sleep the participant got a night, which was changed to an open ended question; whether their baby's sleep patterns allowed them to get a reasonable amount of sleep, which was changed from a yes or no question to a 4-point scale ranging from strongly agree to strongly disagree; and how often they felt tired or fatigued, which was rated on a scale from *never* (1) to *very often* (5). In addition, women were asked how many times they woke up their baby or got woken up during the night by their baby, ranging from not at all to four times or more. Finally, women were asked to rate how much sleep they got on average since the birth of their baby, ranging from "less sleep than usual" to "more sleep than usual."

Elation Scale

The Elation Scale was developed for the purpose of this study to measure sub-clinical postpartum elation. The Oxford Happiness Questionnaire (Kashdan, 2004), the Internal State Scale (Bauer, Vojta, Kinosian, Altshuler, & Glick, 2000), the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), and the Highs Scale

(Glover et al., 1994) were reviewed. We selected and modified items from these scales that were deemed to measure appropriate content. The final questionnaire consisted of 12 statements which were rated using a 7-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7). Thus, the scores on this instrument can range from 0 to 84, with higher scores reflecting a greater level of elation. An item analysis was conducted along with the internal consistency reliability of this scale, which will be presented later.

The Highs Scale (Glover et al., 1994)

The Highs Scale is a self-report scale which was created by Glover et al. (1994). It was based on the hypomania criteria found in the Schedule for Affective Disorders and Schizophrenia-Lifetime Version (SADS-L). The questionnaire consists of seven questions which reflect symptoms of hypomania. Respondents can answer "yes, a lot," "yes, a little," or "no" to each question. The questionnaire is scored by summing the total points with a response of "yes, a lot" receiving two points and "yes, a little" receiving one point. A cut-off score of eight as well as answering yes to the question on elation is needed to classify a case of hypomania. In terms of validation for the instrument, Glover et al. found that 3 out of 5 women who scored above the cut-off score of eight were classified with mild mania whereas only 3 out of 14 women who scored below the cut-off score received a diagnosis using the Comprehensive Psychopathological Rating Scale (CPRS), which was a significant difference.

Procedure

Participants were recruited at anytime during pregnancy for testing in the immediate postpartum period. Potential participants were given contact information so

that they could either phone the laboratory or email the researchers using an email address created solely for the purpose of this study. Once individuals responded either through telephone or email they were notified of the different options for completing the study. The first option involved an online administration of the questionnaire using SurveyMonkey, in which participants were sent a link to the website. The second option involved sending a .pdf version of the questionnaire through email. The final option involved sending a paper version of the questionnaire for those who did not have internet access or who preferred the paper and pencil version. For this option, volunteers needed to provide their name and mailing address so that the questionnaire could be mailed along with a self-addressed stamp for return. To ensure confidentiality, participants were instructed not to provide a return address. In addition, an enhanced security feature, a Secure Sockets Layer (or SSL), was used for SurveyMonkey to encrypt the data.

The first page of the questionnaire package consisted of a covering letter (see Appendix B), which participants were able to keep for their own records. The next page consisted of a consent form (see Appendix C), which included a statement to be endorsed declaring that the individual was indeed over the age of 18 years old. The immediate postpartum questionnaire was given during the first week postpartum, and took approximately 25 to 45 minutes to complete (see Appendix D). A follow-up questionnaire of similar length was provided approximately one month later (see Appendix E). Participants were debriefed and thanked after completing each of the questionnaires (see Appendix F).

Data Treatment

Based on the recommendations by Tabachnick and Fidell (2007), data were

screened for outliers, defined as scores that are three standard deviations above or below the mean. In addition, the assumptions underlying each statistical measure used were assessed prior to data analysis, and were within normal limits. Finally, the internal consistency reliabilities of the measures were calculated.

To test our hypotheses for mood outcome, *t*-tests were used for dichotomous or binary variables (i.e., yes or no) and multiple regression analyses were used to examine continuous data. Stepwise (or statistical) regression was used in the present study due to the fact that it identifies a subset of variables which give the best prediction. In this procedure, independent variables are added one by one if they meet the statistical criteria specified by the researcher (p to enter < 0.07, p to remove > 0.10) and they are deleted at any point when they no longer significantly contribute to the regression equation (Tabachnick & Fidell, 2007).

There were three primary outcome measures used for the present study to examine mood change in the postpartum period. The first outcome variable was depression scores, which were calculated by adding the *z*-scores from the BDI-II and the EPDS and dividing by two. Aggregating scores or averaging over measurements (e.g., combining the BDI-II and EPDS) has been shown to reduce error measurement and increase the reliability, validity, and generalizability of the measurement of a construct (e.g., depression; Epstein, 1983). The second outcome variable was elation scores, which consisted of the total score on the Elation Scale, which was developed for the purpose of this study. The Highs Scale was not aggregated with the Elation Scale for the analyses because of its poor psychometric properties (see Table 9). Finally, the third outcome measure, a composite mood outcome scale, was created to assess mood on a continuum

and was more sensitive to non-clinical mood change. It was created by subtracting each participant's raw elation score from the highest possible elation score (84). These reflected "elation" scores were in turn converted to *z*- scores and added to the depression composite scores. This resulted in a scale in which higher scores represented higher levels of depression and lower levels of elation and lower scores represented lower levels of depression and higher levels of elation.

The present study proposed specific hypotheses in relation to a list of demographic, reproductive, and psychosocial variables that were expected to predict depression, and a smaller subset of variables that were expected to predict elation. However, exploratory analyses were also conducted for the rest of the variables expected to predict depression to see if the elation predictors were similar or different. In addition, the composite mood scale was also used with all the variables as a dependent measure, representing a measure of mood on a continuum as opposed to predicting depression and elation separately.

The organization of the main analyses is set up such that the same set of analyses is presented once for each of the three outcome measures (depression scores, elation scores, and composite mood scores) for both the immediate questionnaire data and then again for the follow-up data.

Results

Data Screening

For the first week postpartum data, the variable MSPSS total score had an outlier ($z = -4.38$), which made the variable negatively skewed. However, MSPSS total score was not transformed and the outlier was not deleted because the value was in the

appropriate range of possible total scores. Due to the small sample size and restrictions in the range of answers, one individual who scored very low on the scale (i.e., had low social support) was deemed an outlier due to the high overall mean on the scale.

The Infrequency Scale was used as a validity check. Two infrequent responses would suggest non-purposeful responding, or confusion, or language difficulties (Jackson, 1984). In Week 1 postpartum, none of the participants responded infrequently, and in Week 5 only one participant answered a single question in the infrequent direction. Therefore, participants in this study responded in a forthright manner.

Characteristics of Participants

Participants had been pregnant an average of 2.09 times (SD = 1.28), and had an average of 1.57 children (SD = 0.86). The majority of infants were delivered by a midwife (48.5%) and were delivered at a hospital (81.8%). A range of pregnancy complications were assessed and the results can be seen in detail in Table 2. (See Table 3 for a description of the reproductive history for the overall sample). Table 4 describes history of mental illness in the family and Table 5 describes past and current episodes of depression. For participants who stated they experienced past episodes of depression (n = 12), the mean age for their first episode was 18.9, with a range of ages for all episodes between 13 and 32. However, three participants had to be excluded because their answers consisted of ranges which were too vague for distinct episodes of depression to be calculated from. For instance, stating the age of first depression as between 18 and 21 years could mean one episode or several episodes during those three years. Information regarding feeding and attachment can be seen in Table 6. Psychosocial information detailing life stress and sleep quality can be seen in Tables 7 and 8 respectively.

Table 2

Descriptive Characteristics of Pregnancy and Birth (N = 33)

Variable		*n*	*(%)*
Delivered by	Family Physician	4	12.12
	Obstetrician	12	36.36
	Midwife	16	48.49
	Nurse	1	3.03
Delivered at	Hospital	27	81.82
	Home	6	18.18
Pregnancy complications (prior pregnancies)	No	9	27.27
	Yes	7	21.21
	This is my first pregnancy	17	51.52
Pregnancy complications (current pregnancy)	No	13	40.62
	Yes	19	59.38
Current pregnancy: Premature contractions	No	30	90.91
	Yes	3	9.09
Instrumental delivery	No	29	87.88
	Yes	4	12.12
Caesarean section	No	26	78.79
	Yes	7	21.21
Induced labour	No	25	75.76
	Yes	8	24.24
Given oxytocin	No	23	69.70
	Yes	10	30.30
Postpartum bleeding	No	30	90.91
	Yes	3	9.09
Other		6	18.18

Note. Counts that do not sum to 33 are a result of unanswered items.

Table 3

Reproductive History for the Overall Sample assessed in Week 1 (N = 33)

Variable		*n*	%	*M*	*SD*
Age at menarche*		28		12.64	1.64
Length of menstrual cycle*		29		30.41	4.40
Duration of menstruation (in days)*		32		5.19	1.75
Trouble with PMS	Strongly disagree	10	30.30		
	Disagree	16	48.49		
	Agree	5	15.15		
	Strongly agree	2	6.06		
PMS affecting mood	Very negatively	1	3.23		
	Slightly negatively	20	64.51		
	In no way at all	10	32.26		
	Slightly positively	0	0.0		
	Very positively	0	0.0		
Puberty affecting mood	Very negatively	3	9.09		
	Slightly negatively	20	60.61		
	In no way at all	7	21.21		
	Slightly positively	1	3.03		
	Very positively	2	6.06		
Times pregnant	1	15	45.46		
	2	7	21.21		
	3	7	21.21		
	4	1	3.03		
	5	3	9.09		
Number of children	1	21	63.64		
	2	6	18.18		
	3	5	15.15		
	4	1	3.03		
Abortion	No	25	75.76		
	Yes	8	24.24		
Miscarriage	No	26	78.79		
	Yes	7	21.21		
Planned Pregnancy (current pregnancy)	No	10	30.30		
	Yes	23	69.70		
Unwanted Pregnancy (current pregnancy)	No	32	96.97		
	Yes	1	3.03		

Note. Counts that do not sum to 33 are a result of unanswered items.

Table 4

Family History for Week 1 Postpartum Data (N = 33)

Variable		*n*	*(%)*
Family history of Mental Illness	No	14	42.42
	Yes	19	57.58
Depression	No	18	54.55
	Yes	15	45.45
Bipolar disorder	No	29	87.88
	Yes	4	12.12
Anxiety Disorders	No	20	60.61
	Yes	13	39.39
Schizophrenia	No	33	100.00
	Yes	0	0.00

Internal Consistency and Reliability of Measures

The mean, standard deviation, and internal consistency is displayed for each scale used in the present study for the first and fifth week postpartum (see Table 9). Excluding the Highs Scale, the rest of the scales used in this study were found to have good internal consistency, with a range from .81 to .96. However, the Highs Scale had extremely poor internal consistency reliability (.64 for Week 1 and .18 for Week 5). On the other hand, the Elation Scale, which was created solely for the purpose of this study, was found to have excellent internal consistency (.94). The internal consistency reliability for the Infrequency Scale was incalculable due to the lack of variance on the items.

EPDS and BDI-II

During Week 1 postpartum, the mean score for the EPDS was 7.95 (*SD* = 4.71;

Table 5

Personal Mental Health History Reported at Week 1 Postpartum (N = 33)

Variable		*n*	*(%)*
Past episode of Depression	No	21	63.64
	Yes	12	36.36
Times Depressed	No history	21	63.64
	1 or more past episodes	11	33.33
	indeterminate	1	3.03
Age for first depressive episode*		18.90	13-32
Treatment received	No history of depression	21	63.64
	No treatment	1	3.03
	holistic therapy	1	3.03
	medication alone	3	9.09
	Counselling alone	1	3.03
	Combination of counselling and medication	6	18.18
Antidepressant meds	No history of depression	21	63.64
	No	3	9.09
	Yes	9	27.27
Positive mood change (past pregnancies)	No	8	24.24
	Yes	5	15.15
	First pregnancy	20	60.61
Negative mood change (past pregnancies)	No	6	18.75
	Yes	8	25.00
	First pregnancy	18	56.25
Diagnosed with postpartum depression	No	12	38.71
	Yes	1	3.23
	First pregnancy	18	58.06
Received treatment for depression	No	11	36.67
	Yes	1	3.33
	First pregnancy	18	60.00

Note. * = Variables that use *M* and *Range* instead of *n* (%). This table includes missing data due to unanswered items.

Table 6

Information on Feeding and Attachment

Variable			Week 1 ($N = 33$) *n*	*(%)*	Week 5 ($N = 19$) *n*	*(%)*
Method of Feeding						
	Breastfeeding	No	2	6.25	3	15.79
		Yes	30	93.75	16	84.21
	Bottle feeding (formula)	No	29	87.88	14	73.68
		Yes	4	12.12	5	26.32
	Bottle feeding (breast-milk)	No	29	87.88	16	84.21
		Yes	4	12.12	3	15.79
Average number of feeding times per day*			9.95	2.90	9.88	3.23
Average length of each feeding*			32.80	16.34	26.31	14.34
Bond with infant		Very weak	0	0.00	0	0.00
		Weak	0	0.00	0	0.00
		Average	1	3.03	2	10.53
		Strong	10	30.30	9	47.37
		Very strong	22	66.67	8	42.10

Note. * = Variables that use *M* and *SD* instead of *n* (%). This table includes missing data due to unanswered items.

see Table 9). The EPDS is typically used as a depression screener, with a cut-off score of 12 or greater used to indicate depression. In this study, 18.7% of women scored above the cut-off score during Week 1 postpartum. For comparative purposes, Lane et al. (1997) reported similar results with a mean EPDS score of 6.8 (*SD* = 4.8) and 11.4% of women with a score of 13 or greater on the EPDS on day three postpartum.

During Week 5 postpartum, the mean score for the EPDS in the present study was 6.66 (*SD* = 4.32) and 11.2% of women scored above the cut-off score of 12. Lane et al. (1997) reported a similar mean score in the first week postpartum (*M* = 6.9, *SD* = 4.7),

Table 7

Psychosocial Information: Life Stress

Variable		Week 1 ($N = 33$) *n*	*(%)*	Week 5 ($N = 19$) *n*	*(%)*
Financial problems	No	18	54.55	8	44.44
	Yes	15	45.45	10	55.56
Marital problems	No	30	90.91	14	77.78
	Yes	3	9.09	4	22.22
Death in the family	No	33	100.00	17	94.44
	Yes	0	0.00	1	5.56
Serious illness in the family	No	31	93.94	15	83.33
	Yes	2	6.06	3	16.67
Moving	No	29	90.62	16	88.89
	Yes	3	9.38	2	11.11
Unemployment	No	26	78.79	15	83.33
	Yes	7	21.21	3	16.67
Job change	No	29	87.88	17	94.44
	Yes	4	12.12	1	5.56
Infant Health Problems	No	27	81.82	17	94.44
	Yes	6	18.18	1	5.56
Problems Feeding Baby	No	22	66.67	14	77.78
	Yes	11	33.33	4	22.22
Milk Production Problems	No	31	93.94	15	83.33
	Yes	2	6.06	3	16.67
Problems with baby sleeping	No	29	87.88	16	88.89
	Yes	4	12.12	2	11.11
Baby is irritable or fussy	No	30	90.91	12	66.67
	Yes	3	9.09	6	33.33
Baby cries a lot	No	30	90.91	14	77.78
	Yes	3	9.09	4	22.22
Baby difficult to soothe	No	28	87.50	16	88.89
	Yes	4	12.50	2	11.11

Note. This table includes missing data due to unanswered items.

Table 8

Psychosocial Information: Sleep Quality

Variable		Week 1 ($N = 33$) *n*	*(%)*	Week 5 ($N = 19$) *n*	*(%)*
Baby's quality of sleep	Very well	10	30.30	3	17.65
	Well/Good	8	24.24	4	23.53
	Average	13	39.40	9	52.94
	Poor	2	6.06	0	0.00
	Very poorly	0	0.00	1	5.88
Times woken up at night	Once	2	6.06	2	11.77
	Twice	10	30.30	8	47.06
	Three times	14	42.43	6	35.29
	4 times or more	7	21.21	1	5.88
Hours of sleep per night*		5.06	1.31	5.77	1.31
Baby's sleep pattern allows a reasonable amount of sleep	Strongly agree	3	9.09	2	11.11
	Agree	15	45.46	9	50.00
	Disagree	12	36.36	5	27.78
	Strongly disagree	3	9.09	2	11.11
Amount of sleep	Less than usual	23	69.70	9	50.00
	A little less than usual	9	27.27	7	38.88
	Average	1	3.03	1	5.56
	A bit more than usual	0	0.00	1	5.56
Feel fatigued or tired	Sometimes	12	36.36	4	23.53
	Occasionally	8	24.24	5	29.41
	Often	12	36.37	7	41.18
	Very often	1	3.03	1	5.88

Note. * = Variables that use *M* and *SD* instead of *n (%)*. This table includes missing data due to unanswered items.

Table 9

Psychometric Properties of the Scales

Scale	Week 1 ($N = 33$)			Week 5 ($N = 19$)		
	M	*SD*	Cronbach's α	*M*	*SD*	Cronbach's α
Infrequency	0.03	0.17	ǂ	0.05	0.22	ǂ
EPDS	7.95	4.71	.87 (.84)*	6.66	4.32	.88 (.85)*
DYAS	122.46	14.35	.91	112.52	20.03	.95
PSS	20.93	7.52	.88	20.43	9.57	.93
MSPSS	73.50	12.43	.93	68.22	16.22	.96
BDI-II	10.33	5.16	.83 (.81)*	10.55	6.62	.88(.87)*
Elation Scale	60.03	12.63	.94	56.12	13.98	.94
The Highs Scale	2.96	2.15	.64	1.88	1.45	.18

Note. The suicide items on the EPDS (item 10) and BDI (item 9) were removed and an average score for the scale for each participant was used as a filler score to retain the original scoring used for both of the scales. Thus, * = the internal consistency reliability after the filler item was removed for comparison purposes only. In addition, ǂ = incalculable. This table includes missing data due to unanswered items.

and 11% of women were found to score above 13.

The BDI-II was also used to measure depression in this study. The mean score for the BDI-II during Week 1 postpartum was 10.33 (*SD* = 5.16). Based on the scoring criteria used for the BDI-II, in the first week postpartum 81.3% of women had minimal depressive symptoms, 12.5% had mild depressive symptoms, 6.2% had moderate depressive symptoms, and 0% had severe depressive symptoms. The mean BDI-II score for Week 5 was 10.55 (*SD* = 6.62). In addition, 61.1% of women had minimal depressive

symptoms in Week 5, 33.3% had mild depressive symptoms, 5.6% had moderate depressive symptoms, and 0% had severe depressive symptoms.

The BDI-II was found to significantly correlate with the EPDS in Week 1, r (30) = .74, $p < .01$. In fact, the two measures both classified 18.7% of women as depressed in Week 1 (if you combine the percentages for mild and moderate symptoms for the BDI-II). The BDI-II and EPDS were found to significantly correlate in Week 5 as well, r (16) = .63, $p < .01$. However, the EPDS and BDI-II portray different pictures for Week 5 postpartum, with the EPDS classifying 11.2% of women above the cut-off score for depression and the BDI-II classifying 38.9% as depressed.

Highs Scale

During Week 1 postpartum, the mean score for the Highs Scale was 2.96 (SD = 42.15), out of a possible score of 14. The Highs Scale was developed by Glover et al. (1994) as a screener of hypomania, with a cut-off score of eight used to classify a case of hypomania. In this study, only 3% of women scored at or above the cut-off score during Week 1 postpartum, in comparison to 11% and 8.3% of women in previous studies (Glover et al., 1994; Lane et al., 1994). In Week 5 postpartum, the mean score for the Highs Scale in the present study was 1.88 (SD = 1.45) and 0% of women scored above the cut-off score. In comparison, previous studies have found that 7.6% and 9% of women at six weeks postpartum scored above the cut-off score (Glover et al., 1994; Lane et al., 1997).

The Highs Scale was not aggregated with the Elation Scale in the present study to measure elation due to its poor psychometric properties (see Table 9). However, it did significantly correlate with the Elation Scale at Week 1, r (29) = .37, $p < .05$, but not at

Week 5, r (13) = .08, p > .05. In addition, Highs total scores did predict elation scores in Week 1 in a standard multiple regression analysis, F (1, 29) = 4.65, p = .04, with adjusted R^2 at .11, indicating that 11% of the variability in elation scores was predicted by Highs total scores. To see which items on the Highs Scale correlated most highly with the Elation Scale, a correlation matrix was generated (see Table 10). Question five on the Highs Scale (Have you felt that you are a specially important person with special talents or abilities) was found to correlate the highest with elation scores, r (29) = .54, p < .01, followed by question one (Have you felt elated [high or unusually cheerful]?), r (29) = .42, p < .05.

Main Analyses for Immediate Predictors of Depression in Week 1

Demographic and Psychiatric History Variables

A t-test could not be conducted to examine the relationship between depression scores at Week 1 (sum of the z-scores for the BDI-II and EPDS) and marital status (single versus in a relationship), since all 33 participants were in a relationship. A stepwise regression was performed with Week 1 depression scores (the sum of the z-scores for the BDI-II and EPDS) as the dependent variable and age and education as the independent variables. However, the model was not significant, and there were no predictors of depression found.

Two independent samples t-tests were conducted for the binary psychiatric history variables (i.e., yes/no responses). The t-tests comparing Week 1 depression scores in women with and without a past episode of depression or family history of mental illness were not significant, ps > .05 (see Appendix G for the means, standard deviations, and t-values for all of the non-significant t-tests).

Table 10

Correlations between Individual Highs Items and Elation Total Scores in Week 1 Postpartum

Item #	Highs01	Highs02	Highs03	Highs04	Highs05	Highs06	Highs07	Elation Total
1	1.0	.40*	.42*	.41*	.34	.30	.09	.42*
2		1.0	.33	.07	-.05	-.25	-.09	.40*
3			1.0	.39*	.30	-.02	.21	.24
4				1.0	.46**	.28	.30	.14
5					1.0	.15	.06	.54**
6						1.0	-.18	.24
7							1.0	-.37*
Elation Total								1.0

Note. * $p < .05$. ** $p < .01$.

Reproductive Variables

A series of regression analyses were performed for the continuous reproductive variables. A stepwise regression was performed between depression scores (*z*-scores for the BDI-II and EPDS combined) at Week 1 as the dependent variable and age at menarche, period regularity, the effect of puberty on mood, presence of PMS symptoms, the effect of PMS on mood, number of times pregnant, and number of biological children as the independent variables. However, the model was not significant and there were no predictors of depression found.

Five independent samples *t*-tests were conducted for the binary reproductive variables (i.e., yes/no responses). The *t*-test comparing Week 1 depression scores in women with and without a history of abortion was found to be marginally significant,

t (8.6) = -1.89, p = .09. There was a trend towards women with a positive history of having an abortion having higher depression scores (M = 0.65, SD = 1.23) compared to women with no such history (M = -0.22, SD = 0.72). However, if EPDS scores were used instead of the combined BDI-II and EPDS depression scores, women with a history of abortion had significantly higher depression scores (M = 10.97, SD = 5.43) compared to women without a history of abortion (M = 6.94, SD = 4.10), t (30) = -2.22, p = .03. The t-tests comparing history of miscarriage, presence of pregnancy complications, and planned or unplanned pregnancy for Week 1 depression scores were not found to be significant, all $ps > .05$. The t-test comparing having experienced past negative mood change in the postpartum period and depression scores was found to be significant, t (12) = -3.08, p = .01, with women having had a past history of negative mood change during the postpartum period having higher depression scores (M = 0.83, SD = 1.13) compared to women with no such history (M = -0.68, SD = 0.48). See Table 11 for a comparison of the significant Week 1 depression findings using the EPDS and the BDI-II separately and in combination.

Psychosocial Variables

A series of regression analyses were performed for the continuous psychosocial variables. A stepwise regression was performed between depression scores (z-scores for the BDI-II and EPDS combined) at Week 1 as the dependent variable and total scores for the Perceived Stress Scale, Dyadic Adjustment Scale, and the Multidimensional Scale of Perceived Social Support as independent variables. R for regression was significantly different from zero, F (2, 21) = 16.17, $p < .001$, with R^2 at .60, and adjusted R^2 at .56, indicating that 56% of the variability in depression scores was predicted by the total

Table 11

Significance Levels for Analyses using the EPDS and BDI-II Separately and in Combination for Significant Depression Findings in Week 1 Postpartum

Variable	EPDS	BDI-II	Combined *z*-score
Week 1 Predictors			
Abortion	-2.22*	-1.73	-1.89
Past negative mood change	-3.64**	-2.56*	-3.08*
Perceived Stress Scale total score	4.45**	2.97**	4.86**
Dyadic Adjustment Scale total score	0.72	-4.47**	-2.18*
Life stress: Problems feeding baby	-2.97**	-1.61	-2.44*
Hours of sleep per night	-2.07*	-0.11	-0.93
Amount of sleep (Likert-type)	0.00	-2.94**	-2.03
Bond	-3.37**	-3.13**	-3.57**

Note. Values in this table represent *t*-statistics. * $p < .05$. ** $p < .01$.

Perceived Stress Scale and Dyadic Adjustment Scale scores. The Perceived Stress Scale score was the variable which contributed the most unique variance in predicting depression scores, $t\,(21) = 4.86, p < .001$, indicating that women with higher perceived stress scores have higher depression scores. In addition, the Dyadic Adjustment Scale score also significantly predicted depression scores, $t\,(21) = -2.18, p = .04$, indicating that women with lower perceived marital satisfaction had higher depression scores.

A series of six *t*-tests were conducted to examine the relationships between depression scores and the following life stress questions: financial problems, unemployment, job change, infant health problems, problems feeding baby, and whether or not the baby was difficult to soothe (moving and whether the baby was irritable or fussy were excluded due to small sample sizes). The *t*-test comparing feeding problems and the sum of the *z*-scores for the BDI-II and EPDS for Week 1(or depression scores) was found to be significant, $t\ (30) = -2.44, p = .02$. Women who indicated that they had problems feeding their baby had higher depression scores ($M = 0.52$, $SD = 1.08$) compared to women who did not indicate having problems ($M = -0.27$, $SD = 0.73$). This difference was more noticeable using the EPDS separately, where the mean was 6.35 ($SD = 4.00$) for women who did not have a problem feeding their babies and 11.01 ($SD = 4.62$) for women who did report having problems feeding their babies (see Table 11). None of the other *t*-tests were significant, all $ps > .05$.

A stepwise regression was performed between depression scores (*z*-scores for the BDI-II and EPDS combined) as the dependent variable and six sleep-related variables. *R* for regression was marginally significant, $F\ (1, 30) = 4.13, p = .05$, with R^2 at .12, and adjusted R^2 at .09, indicating that 9% of the variability in depression scores was predicted by the following question: "On average I am getting," with responses ranging from *less sleep than usual* to *more sleep than usual* on a 5-point Likert-type scale. This question was the only variable which predicted depression scores, $t\ (30) = -2.03, p = .05$, indicating that women who received less sleep than usual had higher depression scores and vice versa.

A bivariate regression analysis was performed with depression scores (*z*-scores for the BDI-II and EPDS combined) at Week 1 as the dependent variable and bond with infant (rated on a 5-point Likert-type scale from very weak to very strong) as the independent variable. *R* for regression was significantly different from zero, $F(1, 30) = 12.75$, $p = .001$, with R^2 at .30, and adjusted R^2 at .28, indicating that 28% of the variability in depression scores was predicted by the mother's rating of her bond with her infant. Bond with infant significantly predicted depression scores, $t(30) = -3.57$, $p = .001$, indicating that women who rated their bond with their infant as lower had higher depression scores. Alternatively, this could indicate that women who were experiencing depression had more negative appraisals of their bond with their infant.

An independent samples t-test could not be conducted comparing depression scores (sum of the BDI-II and EPDS *z*-scores for Week 1) with women who breastfed and those who did not, due to the fact that only two women reported that they did not breastfeed their baby (see Table 12 for the correlations between depression *z*-scores in Week 1 and all the demographic, reproductive, and psychosocial variables mentioned above).

Main Analyses for Immediate Predictors of Elation in Week 1

Demographic and Psychiatric History Variables

A stepwise regression was performed with Elation Scale total scores at Week 1 as the dependent variable and age and education as the independent variables. *R* for regression was marginally significant, $F(1, 28) = 3.6$, $p = .06$, with R^2 at .11, and adjusted R^2 at .08, indicating that 8% of the variability in elation scores was predicted by age. Age was the only variable that contributed unique variance to elation scores, $t(28) =$

Table 12

Correlations between Demographic, Reproductive, and Psychosocial Variables and Depression Z-Scores at Week 1 Postpartum

Variable	*N*	Pearson's *r*
Demographic and Psychiatric History Variables		
Age	31	.21
Education	32	.04
Past episode of depression	32	.22
History of family mental illness	32	.01
Reproductive Variables		
Age at menarche	28	.05
Regular period	32	-.23
Presence of PMS symptoms	32	.16
Effect of PMS on mood	28	-.33
Effect of puberty on mood	32	-.09
Times pregnant	32	.02
Number of biological children	32	-.02
Abortion	32	.41*
Miscarriage	32	.16
Pregnancy complications	31	.20
Planned or unplanned pregnancy	32	.26
Past negative mood change	31	-.02
Psychosocial variables		
Perceived Stress Scale	28	.73**
Dyadic Adjustment Scale	29	-.50**
Multidimensional Scale of Perceived Social Support	31	-.36*
Financial problems	32	-.14
Unemployment	32	-.07
Job change	32	-.23
Infant health problems	32	.06
Problems feeding baby	32	.41*
Baby difficult to soothe	32	.16
How well baby sleeps	32	-.10
Times per night woken up to feed baby	32	.12
Hours of sleep per night	32	-.32
Baby's sleep pattern allows reasonable amount of sleep	32	.33
Amount of sleep compared to usual	32	-.35
Frequency of feeling tired or fatigued	32	.28
Bond with infant	32	-.55**

Note. *$p < .05$. **$p < .01$.

-1.9, $p = .06$, indicating that younger women tended to have higher elation scores, and vice versa.

Two independent samples *t*-tests were conducted comparing Week 1 Elation Scale total scores in women with and without a past episode of depression and family history of mental illness, but neither reached significance, $ps > .05$.

Reproductive Variables

A stepwise regression was performed with Elation Scale total scores at Week 1 as the dependent variable and age at menarche, period regularity, the effect of puberty on mood, presence of PMS symptoms, the effect of PMS on mood, number of times pregnant, and number of biological children as the independent variables. However, none of the variables entered the model based on the statistical criteria that was used.

Five independent samples *t*-tests were conducted comparing Elation Scale total scores at Week 1 and history of abortion, history of miscarriage, presence of pregnancy complications, planned or unplanned pregnancy, and past history of negative mood change in the postpartum period. None of these *t*-tests were significant, all $ps > .05$.

Psychosocial Variables

A stepwise regression was performed with Elation Scale total scores at Week 1 as the dependent variable and the total scores for the Perceived Stress Scale, Dyadic Adjustment Scale, and the Multidimensional Scale of Perceived Social Support as independent variables. R for regression was significantly different from zero, $F(1, 23) = 17.74$, $p < .001$, with R^2 at .43, and adjusted R^2 at .41, indicating that 41% of the variability in elation scores was predicted by Perceived Stress Scale scores. The Perceived Stress Scale score was the only variable that significantly predicted elation

scores, t (23) = -4.21, $p < .001$, indicating that women with lower perceived stress scores had higher elation scores.

A series of six t-tests were conducted to examine the relationship between Elation Scale total scores at Week 1 and the following life stress questions: financial problems, unemployment, job change, infant health problems, problems feeding baby, and whether or not the baby was difficult to soothe. Only the t-test comparing job change and elation scores was significant, t (29) = -2.52, $p = .02$. Women who indicated that they experienced a job change had significantly higher scores on the Elation Scale ($M = 73.7$, $SD = 6.55$) than those who indicated no such change ($M = 58.0$, $SD = 12.09$).

A stepwise regression was performed with Elation Scale total scores at Week 1 as the dependent variable and the six sleep-related variables as the independent variables. R for regression was significantly different from zero, F (1, 29) = 9.89, $p = .004$, with R^2 at .25, and adjusted R^2 at .22, indicating that 22% of the variability in elation scores was predicted by how often you feel tired or fatigued (ranging from "never" to "very often"). This question was the only variable that uniquely predicted elation scores, t (29) = -3.14, $p = .004$, indicating that women who seldom felt tired or fatigued had higher Elation Scale total scores and vice versa.

A bivariate regression analysis was performed with Elation Scale total scores at Week 1 as the dependent variable and bond with infant as the independent variable. R for regression was marginally significant, F (1, 29) = 3.96, $p = .056$, with R^2 at .12, and adjusted R^2 at .09, indicating that only 9% of the variability in elation scores was predicted by the mother's rating of her bond with her infant. Bond with infant was also marginally significant when it came to predicting elation scores, t (29) = 1.99, $p = .056$,

suggesting that women who perceived a stronger bond with their infant had higher elation scores (see Table 13 for the correlations between elation scores in Week 1 and all the demographic, reproductive, and psychosocial variables mentioned above).

Main Analyses for Immediate Predictors of Composite Mood Scores in Week 1

Demographic and Psychiatric History Variables

A stepwise regression was performed with the composite mood scale *z*-scores at Week 1 (composed of both the combined BDI-II and EPDS *z*-scores and the reflected elation *z*-scores) as the dependent variable and age and education as the independent variables. However, the model was not significant.

Two independent samples *t*-tests were conducted to examine the effect of past episode of depression and family history of mental illness on Week 1 composite mood scale *z*-scores; however neither test reached significance, $ps < .05$.

Reproductive Variables

A series of regression analyses were performed for the continuous reproductive variables. A stepwise regression was performed with the composite mood *z*-scores at Week 1 as the dependent variable and age at menarche, period regularity, the effect of puberty on mood, presence of PMS symptoms, the effect of PMS on mood, number of times pregnant, and number of biological children as the independent variables. However, the model was not found to be significant and there were no predictors of mood found.

Five independent samples *t*-tests were conducted comparing the effect of the following variables on Week 1 composite mood scale *z*-scores: history of abortion, history of miscarriage, presence of pregnancy complications, planned or unplanned

Table 13

Correlations between Demographic, Reproductive, and Psychosocial Variables and Elation Total Scores at Week 1 Postpartum

Variable	*N*	Pearson's *r*
Demographic and Psychiatric History Variables		
Age	30	-.34
Education	31	-.23
Past episode of depression	31	-.25
History of family mental illness	31	-.11
Reproductive Variables		
Age at menarche	26	-.16
Regular period	31	.01
Presence of PMS symptoms	31	-.09
Effect of PMS on mood	29	.34
Effect of puberty on mood	31	.36*
Times pregnant	31	.01
Number of biological children	31	-.16
Abortion	31	-.17
Miscarriage	31	.15
Pregnancy complications	30	-.28
Planned or unplanned pregnancy	31	-.19
Past negative mood change	30	-.06
Psychosocial variables		
Perceived Stress Scale	29	-.69**
Dyadic Adjustment Scale	28	.33
Multidimensional Scale of Perceived Social Support	30	.27
Financial problems	31	.30
Unemployment	31	.17
Job change	31	.43*
Infant health problems	31	-.06
Problems feeding baby	31	-.03
Baby difficult to soothe	30	-.22
How well baby sleeps	31	-.09
Times per night woken up to feed baby	31	.00
Hours of sleep per night	31	.01
Baby's sleep pattern allows reasonable amount of sleep	31	-.33
Amount of sleep compared to usual	31	-.03
Frequency of feeling tired or fatigued	31	-.50**
Bond with infant	31	.35

Note. *$p < .05$. **$p < .01$.

pregnancy, and past history of negative mood change in the postpartum period. Only the *t*-test comparing composite mood *z*-scores for women who did and did not have a history of past negative mood change in the postpartum period was significant, $t\ (8.8) = -2.74$, $p = .02$. Women who had a past history of negative mood change during the postpartum period scored higher on the composite mood scale ($M = 1.22$, $SD = 1.96$; indicating higher depression scores) compared to women with no such history ($M = -1.06$, $SD = 0.93$; indicating higher elation scores).

Psychosocial Variables

A series of regression analyses were performed for the continuous psychosocial variables. A stepwise regression was performed with Week 1 composite mood *z*-scores as the dependent variable and total scores for the Perceived Stress Scale, Dyadic Adjustment Scale, and the Multidimensional Scale of Perceived Social Support as independent variables. *R* for regression was significantly different from zero, $F\ (1, 22) = 31.29$, $p < .001$, with R^2 at .58, and adjusted R^2 at .56, indicating that 56% of the variability in composite mood scores was predicted by the Perceived Stress Scale scores. The Perceived Stress Scale score was the only variable that contributed unique variance and significantly predicted composite mood scores, $t\ (22) = 5.59$, $p < .001$, indicating that women with high perceived stress scores had higher composite mood scores (i.e., higher depression scores), and women with low perceived stress scores had lower mood composite scores (i.e., higher elation scores).

A series of six *t*-tests were conducted to examine the relationship between Week 1 composite mood *z*-scores and the following life stress questions: financial problems, unemployment, job change, infant health problems, problems feeding baby, and whether

or not the baby was difficult to soothe. The *t*-test comparing job change and composite mood *z*-scores was the only test which was significant, $t(28) = 2.09, p = .04$. Women who indicated that they experienced a job change scored lower ($M = -1.65$, $SD = 0.57$; indicating higher elation scores) than those who did not experience a job change ($M = 0.12$, $SD = 1.66$; indicating higher depression scores).

A stepwise regression was performed with composite mood *z*-scores as the dependent variable and the six sleep-related variables as the independent variables. *R* for regression was significantly different from zero, $F(1, 28) = 5.36, p = .02$, with R^2 at .16, and adjusted R^2 at .13, indicating that 13% of the variability in composite mood *z*-scores was predicted by how often the participant felt tired or fatigued (ranging from "never" to "very often"). This was the only variable that significantly predicted mood scores, $t(28) = 2.31, p = .02$, indicating that women who often felt tired or fatigued had higher composite mood scores, indicating that they had higher depression scores. Or, fatigue could have been an early symptom of depression and therefore this relationship would be expected.

A bivariate regression analysis was performed with Week 1 composite mood *z*-scores as the dependent variable and bond with infant as the independent variable. *R* for regression was significantly different from zero, $F(1, 28) = 12.24, p = .002$, with R^2 at .30, and adjusted R^2 at .28, indicating that 28% of the variability in composite mood scores was predicted by the mother's rating of her bond with her infant. Bond with infant significantly predicted composite mood scores, $t(28) = -3.50, p = .002$, indicating that women who perceived a weaker bond with their infant had higher composite mood *z*-scores (i.e., were more depressed; see Table 14 for the correlations between composite

Table 14

Correlations between Demographic, Reproductive, and Psychosocial Variables and Composite Mood Scores at Week 1 Postpartum

Variable	*N*	Pearson's *r*
Demographic and Psychiatric History Variables		
Age	29	.25
Education	30	.15
Past episode of depression	30	.31
History of family mental illness	30	.13
Reproductive Variables		
Age at menarche	26	.12
Regular period	30	-.07
Presence of PMS symptoms	30	.17
Effect of PMS on mood	28	-.36
Effect of puberty on mood	30	-.31
Times pregnant	30	.02
Number of biological children	30	.12
Abortion	30	.35
Miscarriage	30	.01
Pregnancy complications	29	.26
Planned or unplanned pregnancy	30	.22
Past negative mood change	29	-.01
Psychosocial variables		
Perceived Stress Scale	30	.54**
Dyadic Adjustment Scale	27	-.49**
Multidimensional Scale of Perceived Social Support	29	-.41*
Financial problems	30	-.24
Unemployment	30	-.11
Job change	30	-.37*
Infant health problems	30	.01
Problems feeding baby	30	.25
Baby difficult to soothe	30	.18
How well baby sleeps	30	-.08
Times per night woken up to feed baby	30	.05
Hours of sleep per night	30	-.16
Baby's sleep pattern allows reasonable amount of sleep	30	.29
Amount of sleep compared to usual	30	-.14
Frequency of feeling tired or fatigued	30	.40*
Bond with infant	30	-.55**

Note. $*p < .05$. $**p < .01$. Composite mood scale = the BDI-II and EPDS *z*-scores and the reflected elation *z*-scores combined into one continuous measure.

mood scores in Week 1 and all the demographic, reproductive, and psychosocial variables mentioned above).

Main Analyses for Predictors of Depression in Week 5

Demographic and Psychiatric History Variables

A *t*-test could not be conducted to examine the relationship between Week 5 depression scores (sum of the *z*-scores for the BDI-II and EPDS) and marital status (single versus in a relationship), since all of the participants were in a relationship. A stepwise regression was performed with Week 5 depression scores (the sum of the *z*-scores for the BDI-II and EPDS for Week 5) as the dependent variable and age and education as the independent variables. However, the model was not significant.

Two independent samples *t*-tests were conducted to compare the effect of past episode of depression and family history of mental illness on Week 5 depression scores, but neither was significant (*p*s > .05).

Reproductive Variables

A series of regression analyses were performed for the continuous reproductive variables. A stepwise regression was performed between Week 5 depression scores (*z*-scores for the BDI-II and EPDS combined) as the dependent variable and age at menarche, period regularity, the effect of puberty on mood, presence of PMS symptoms, the effect of PMS on mood, number of times pregnant, and number of biological children as the independent variables. *R* for regression was marginally significant, $F(1, 12) = 3.69$, $p = .07$, with R^2 at .24, and adjusted R^2 at .17, indicating that 17% of the variability in depression scores was predicted by the effect of PMS on mood. The effect of PMS on mood was the only variable that approached significance, $t(12) = -1.92$, $p = .07$,

indicating that women who stated that PMS affected their mood more negatively had higher depression scores than women who reported that PMS affected their mood less negatively or in no way at all.

Five independent samples *t*-tests were conducted to examine the effect of the following binary reproductive variables on Week 5 depression scores: history of abortion, history of miscarriage, presence of pregnancy complications, planned or unplanned pregnancy, and history of negative mood change in the postpartum period. The *t*-test comparing history of abortion and depression scores was significant, $t\ (15) = -3.79$, $p = .002$. Women with a positive history of having an abortion had higher depression scores ($M = 0.84$, $SD = 0.75$) compared to women with no such history ($M = -0.47$, $SD = 0.65$). None of the other *t*-tests reached significance, all $ps > .05$.

Psychosocial Variables

A series of regression analyses were performed for the continuous psychosocial variables. A stepwise regression was performed with Week 5 depression scores (*z*-scores for the BDI-II and EPDS combined) as the dependent variable and total scores for the Perceived Stress Scale, Dyadic Adjustment Scale, and the Multidimensional Scale of Perceived Social Support as independent variables. The model was not significant, and there were no predictors of depression found.

A series of three *t*-tests were conducted to examine the relationship between Week 5 depression scores and the following life stress questions: financial problems, problems feeding baby, and whether or not the baby was irritable (job change, unemployment, infant health problems, moving, and whether or not the baby was

difficult to soothe were excluded due to the small number of participants endorsing those items). None of these *t*-tests reached significance, all *ps* > .05.

A stepwise regression was performed with Week 5 depression scores as the dependent variable and the six sleep-related independent variables. However, the model was not significant.

A bivariate regression analysis was performed between Week 5 depression scores (*z*-scores for the BDI-II and EPDS combined) as the dependent variable and bond with infant as the independent variable. *R* for regression was significantly different from zero, $F(1, 15) = 7.92, p = .01$, with R^2 at .35, and adjusted R^2 at .30, indicating that 30% of the variability in depression scores was predicted by the mother's rating of her bond with her infant. Bond with infant significantly predicted depression scores, $t(15) = -2.81, p = .01$, indicating that women who rated their bond with their infant as weaker had higher depression scores (see Table 15 for the correlations between depression *z*-scores in Week 5 and all the demographic, reproductive, and psychosocial variables mentioned above and Table 16 for a summary of significant predictors of depression in Week 1 and 5).

Main Analyses for Predictors of Elation in Week 5

Demographic and Psychiatric History Variables

A stepwise regression was performed with Week 5 Elation Scale total scores as the dependent variable and age and education as the independent variables. However, the model did not reach significance.

Two independent samples *t*-tests were conducted to examine the effect of a past episode of depression and family history of mental illness on Week 5 Elation Scale total scores. However, neither *t*-test reached significance, *ps* > .05.

Table 15

Correlations between Demographic, Reproductive, and Psychosocial Variables and Depression Z-Scores at Week 5 Postpartum

Variable	*N*	Pearson's *r*
Demographic and Psychiatric History Variables		
Age	18	.07
Education	17	-.36
Past episode of depression	17	.16
History of family mental illness	17	-.19
Reproductive Variables		
Age at menarche	15	-.04
Regular period	17	-.22
Presence of PMS symptoms	17	.42
Effect of PMS on mood	16	-.52*
Effect of puberty on mood	17	-.38
Times pregnant	17	.10
Number of biological children	17	.01
Abortion	17	.70**
Miscarriage	17	.04
Pregnancy complications	16	-.06
Planned or unplanned pregnancy	17	.23
Past negative mood change	17	-.40
Psychosocial variables		
Perceived Stress Scale	15	.43
Dyadic Adjustment Scale	16	-.25
Multidimensional Scale of Perceived Social Support	16	-.12
Financial problems	17	-.05
Unemployment	17	.29
Job change	17	-.37
Infant health problems	17	.36
Problems feeding baby	17	.22
Baby difficult to soothe	16	-.02
How well baby sleeps	17	.00
Times per night woken up to feed baby	17	.05
Hours of sleep per night	17	-.09
Baby's sleep pattern allows reasonable amount of sleep	17	-.07
Amount of sleep compared to usual	17	-.07
Frequency of feeling tired or fatigued	17	-.09
Bond with infant	17	-.59*

Note. $*p < .05$. $**p < .01$.

Table 16

Summary of Predictors of Depression Scores in Week 1 and Week 5 Postpartum

Variable	*B*	*SE B*	*β*	R^2	*t*	*p*	d^1	d^2
Week 1								
Abortion					-1.89	.09	.86	1.4
Past negative mood change					-3.08	.01	1.7	1.7
Perceived Stress Scale total score	.08	.02	.72	.49	4.86	< .001		
Dyadic Adjustment Scale total score	-.02	.01	-.33	.56	-2.18	.04		
Life stress: Problems feeding baby					-2.44	.02	.84	.93
Amount of sleep compared to usual	-.59	.29	-.34	.09	-2.03	.05		
Bond	-.92	.25	-.54	.28	-3.57	.001		
Week 5								
Effect of PMS on mood	-.77	.40	-.49	.17	-1.92	.07		
Abortion					-3.79	.002	1.8	2.04
Bond	-.87	3.1	-.58	.30	-2.81	.01		

Note. R^2 = Adjusted R^2. *d* = Cohen's *d*, or a measure of effect size. Since there are multiple formulas for calculating effect sizes for independent groups, $d^1 = M_1 - M_2 / sd_{pooled}$, where $sd_{pooled} = \sqrt{[(sd_1^2 + sd_2^2) / 2]}$, and $d^2 = t\,(n_1 + n_2) / [\sqrt{(df)}\,\sqrt{(n_1 n_2)}]$. The first effect size measure tends to be the most conservative estimate of effect size. The effect size calculator used for d^1 can be found at http://web.uccs.edu/lbecker/Psy590/es.htm. Note that d^2 was calculated in excel using the formula listed above.

Reproductive Variables

A stepwise regression was performed with Week 5 Elation Scale total scores as the dependent variable and age at menarche, period regularity, the effect of puberty on mood, presence of PMS symptoms, the effect of PMS on mood, number of times pregnant, and number of biological children as the independent variables. Only three variables remained in the regression equation, or met the statistical criteria needed for inclusion. After step 3, $R^2 = .79$, $F\,(3, 8) = 9.99$, $p = .004$, with adjusted R^2 at .71, indicating that 71% of the variability in elation scores was predicted by the effect of PMS on mood, period regularity, and the effect of puberty on mood. At step 1, the effect of PMS on mood predicted the most variance in elation scores, R^2 change = .37, $t\,(8) = 2.41$, $p = .03$, indicating that women who stated that PMS affected their mood more positively had higher elation scores. After step 2, period regularity significantly added to the prediction of elation scores, R^2 change = .24, $t\,(8) = -2.33$, $p = .04$, indicating that women who agreed that their period was regular had higher elation scores than women who disagreed. Finally, at step 3, the effect of puberty on mood significantly added to the prediction of elation scores, R^2 change = .18, $t\,(8) = 2.64$, $p = .03$, indicating that women who stated going through puberty affected their mood in a positive way had higher elation scores and vice versa.

Five independent samples *t*-tests were conducted to examine the effect of the following variables on Week 5 Elation Scale total scores: history of abortion, history of miscarriage, presence of pregnancy complications, planned or unplanned pregnancy, and past history of negative mood change in the postpartum period. The *t*-test comparing history of abortion and elation scores was found to be significant, $t\,(13) = 3.14$, $p = .008$.

Women with a positive history of having an abortion had lower elation scores ($M = 41.5$, $SD = 9.57$) compared to women with no such history ($M = 62.09$, $SD = 11.67$). None of the other t-tests reached significance, all $ps > .05$.

Psychosocial Variables

A stepwise regression was performed with Week 5 Elation Scale total scores as the dependent variable and total scores for the Perceived Stress Scale, Dyadic Adjustment Scale, and the Multidimensional Scale of Perceived Social Support as independent variables. However, the model was not significant.

A series of three t-tests were conducted to examine the relationship between Elation Scale total scores and the following life stress questions: financial problems, problems feeding baby, and whether or not the baby was irritable. None of these t-tests reached significance, all $ps > .05$.

A stepwise regression was performed with Week 5 Elation Scale total scores as the dependent variable and the six sleep-related variables as the independent variables. The model was not significant, and there were no predictors of elation found.

A bivariate regression analysis was performed with Week 5 Elation Scale total scores as the dependent variable and bond with infant as the independent variable. R for regression was significantly different from zero, $F(1, 13) = 9.23, p = .01$, with R^2 at .42, and adjusted R^2 at .37, indicating that 37% of the variability in elation scores was predicted by the mother's rating of her bond with her infant. Bond with infant significantly predicted elation scores, $t(13) = 3.04, p = .01$, indicating that women who perceived a stronger bond with their infant had higher elation scores (see Table 17 for the correlations between elation scores in Week 5 and all the demographic, reproductive, and

Table 17

Correlations between Demographic, Reproductive, and Psychosocial Variables and Elation Total Scores at Week 5 Postpartum

Variable	*N*	Pearson's *r*
Demographic and Psychiatric History Variables		
Age	16	.28
Education	15	.34
Past episode of depression	15	-.38
History of family mental illness	15	.10
Reproductive Variables		
Age at menarche	13	.02
Regular period	15	-.18
Presence of PMS symptoms	15	-.35
Effect of PMS on mood	14	.53*
Effect of puberty on mood	15	.53*
Times pregnant	15	.04
Number of biological children	15	.00
Abortion	15	-.66**
Miscarriage	15	.39
Pregnancy complications	14	-.16
Planned or unplanned pregnancy	15	.09
Past negative mood change	15	.23
Psychosocial variables		
Perceived Stress Scale	14	-.26
Dyadic Adjustment Scale	14	.13
Multidimensional Scale of Perceived Social Support	14	.40
Financial problems	15	-.19
Unemployment	15	-.24
Job change	15	.53*
Infant health problems	15	-.05
Problems feeding baby	15	.07
Baby difficult to soothe	14	-.07
How well baby sleeps	15	.09
Times per night woken up to feed baby	15	-.08
Hours of sleep per night	15	-.03
Baby's sleep pattern allows reasonable amount of sleep	15	.17
Amount of sleep compared to usual	15	-.09
Frequency of feeling tired or fatigued	15	-.16
Bond with infant	15	.64**

Note. $*p < .05$. $**p < .01$.

psychosocial variables mentioned above and Table 18 for a summary of significant predictors of elation in Week 1 and 5).

Main Analyses for Predictors of Composite Mood Scores in Week 5

Demographic and Psychiatric History Variables

A stepwise regression was performed with the Week 5 composite mood scale *z*-scores as the dependent variable and age and education as the independent variables. However, the model was not significant.

Two independent samples *t*-tests were conducted to compare the effects of past episode of depression and family history of mental illness on Week 5 composite mood scale *z*-scores. However, both tests failed to reach significance, $ps > .05$.

Reproductive Variables

A series of regression analyses were performed for the continuous reproductive variables. A stepwise regression was performed with the Week 5 composite mood *z*-scores as the dependent variable and age at menarche, period regularity, the effect of puberty on mood, presence of PMS symptoms, the effect of PMS on mood, number of times pregnant, and number of biological children as independent variables. *R* for regression was significantly different from zero, $F(1, 10) = 5.14, p = .04$, with R^2 at .34, and adjusted R^2 at .27, indicating that 27% of the variability in composite mood scores was predicted by the effect of PMS on mood. The effect of PMS on mood was the only variable that significantly predicted composite mood scores, $t(10) = -2.27, p = .04$, indicating that women who stated that PMS affected their mood "very negatively" had higher mood composite scores (indicating higher depression scores), and women who stated that PMS "slightly negatively" or "in no way at all" affected their mood had higher

Table 18

Summary of Predictors of Elation Scores in Week 1 and Week 5 Postpartum

Variable	*B*	*SE B*	*β*	R^2	*t*	*p*	d^1	d^2
Week 1								
Age	-.87	.45	-.34	.08	-1.9	.06		
Perceived Stress Scale total score	-1.09	.25	-.660	.41	-4.21	<.001		
Life stress: Job change					-2.52	.02	1.6	1.3
Fatigued or tired	-6.84	2.17	-.50	.22	-3.14	.004		
Bond	7.95	3.99	.34	.09	1.99	.056		
Week 5								
Effect of PMS on mood	14.43	5.98	.61	.37*	2.41	.03		
Period regularity	-4.77	2.05	-.49	.24*	-2.33	.04		
Effect of puberty on mood	5.59	2.11	.45	.18*	2.64	.03		
Abortion					3.14	.008	1.7	1.9
Bond	14.44	4.75	.64	.37	3.03	.01		

Note. * = R Square Change. R^2 = Adjusted R^2. *d* = Cohen's *d*, or a measure of effect size. Since there are multiple formulas for calculating effect sizes for independent groups, $d^1 = M_1 - M_2 / sd_{pooled}$, where $sd_{pooled} = \sqrt{[(sd_1^2 + sd_2^2) / 2]}$, and $d^2 = t (n_1 + n_2) / [\sqrt{(df)}\ \sqrt{(n_1 n_2)}]$. The first effect size measure tends to be the most conservative estimate of effect size. The effect size calculator used for d^1 can be found at http://web.uccs.edu/lbecker/Psy590/es.htm. Note that d^2 was calculated in excel using the formula listed above.

mood composite scores (indicating higher elation scores).

Five independent samples *t*-tests were conducted comparing the Week 5 composite mood scale *z*-scores to the following binary variables: history of abortion, history of miscarriage, presence of pregnancy complications, planned or unplanned pregnancy, and past history of negative mood change in the postpartum period. The *t*-test comparing history of abortion and composite mood *z*-scores was found to be significant, $t(13) = -4.08$, $p = .001$. Women with a positive history of having an abortion had higher mood composite scores ($M = 2.13$, $SD = 1.45$), or were more depressed, than women with a negative history ($M = -0.90$, $SD = 1.22$), who were more elated. None of the other *t*-tests reached significance, all $ps > .05$.

Psychosocial Variables

A series of regression analyses were performed for the continuous psychosocial variables. A stepwise regression was performed with Week 5 composite mood *z*-scores as the dependent variable and total scores for the Perceived Stress Scale, Dyadic Adjustment Scale, and the Multidimensional Scale of Perceived Social Support as independent variables. The model was not significant, and there were no unique predictors of mood found.

A series of three *t*-tests were conducted to examine the relationship between composite mood *z*-scores and the following life stress questions: financial problems, problems feeding baby, and whether or not the baby was irritable. None of these *t*-tests reached significance, all $ps > .05$.

A stepwise regression was performed with Week 5 composite mood *z*-scores as the dependent variable and the six sleep-related variables as the independent variables, but the model was not significant.

A bivariate regression analysis was performed with Week 5 composite mood *z*-scores as the dependent variable and bond with infant as the independent variable. *R* for regression was significantly different from zero, $F(1, 13) = 10.74, p = .006$, with R^2 at .45, and adjusted R^2 at .41, indicating that 41% of the variability in composite mood scores is predicted by the mother's rating of her bond with her infant. Bond with infant significantly predicted mood composite scores, $t(13) = -3.28, p = .006$, indicating that women who perceived a stronger bond with their infant had a lower mood composite *z*-score (i.e., were more elated), or vice versa (see Table 19 for the correlations between composite mood scores in Week 5 and all the demographic, reproductive, and psychosocial variables mentioned above and Table 20 for a summary of significant predictors of mood composite scores in Week 1 and 5).

Summary Regression Analyses

Finally, multiple regression analyses were performed for all of the dependent variables (i.e., depression *z*-scores, elation total scores, and composite mood *z*-scores) at both Week 1 and Week 5 postpartum, with all the significant predictors entered at step 1 to determine the total amount of variance explained by these variables. Abortion, past negative mood change in the postpartum period, Perceived Stress Scale total score, Dyadic Adjustment Scale total score, problems feeding baby, amount of sleep compared to usual, and bond with infant explained 67% of the total variance in Week 1 depression *z*-scores, $R^2 = .67$, adjusted $R^2 = .52$, $F(7, 16) = 4.59, p = .006$. In Week 5, the effect of

Table 19

Correlations between Demographic, Reproductive, and Psychosocial Variables and Composite Mood Scores at Week 5 Postpartum

Variable	*N*	Pearson's *r*
Demographic and Psychiatric History Variables		
Age	16	-.14
Education	15	-.37
Past episode of depression	15	.31
History of family mental illness	15	-.14
Reproductive Variables		
Age at menarche	13	-.04
Regular period	15	.00
Presence of PMS symptoms	15	.41
Effect of PMS on mood	14	-.57*
Effect of puberty on mood	15	-.49
Times pregnant	15	.01
Number of biological children	15	-.02
Abortion	15	.75**
Miscarriage	15	-.20
Pregnancy complications	14	.05
Planned or unplanned pregnancy	15	.06
Past negative mood change	15	-.33
Psychosocial variables		
Perceived Stress Scale	15	.29
Dyadic Adjustment Scale	14	-.15
Multidimensional Scale of Perceived Social Support	14	-.31
Financial problems	15	.06
Unemployment	15	.30
Job change	15	-.49
Infant health problems	15	.24
Problems feeding baby	15	.06
Baby difficult to soothe	14	-.03
How well baby sleeps	15	-.06
Times per night woken up to feed baby	15	.07
Hours of sleep per night	15	-.04
Baby's sleep pattern allows reasonable amount of sleep	15	-.15
Amount of sleep compared to usual	15	.03
Frequency of feeling tired or fatigued	15	-.02
Bond with infant	15	-.67**

Note. *$p < .05$. **$p < .01$.

Table 20

Summary of Predictors of Composite Mood Scores in Week 1 and Week 5 Postpartum

Variable	*B*	*SE B*	*β*	R^2	*t*	*p*	d^1	d^2
Week 1								
Past negative mood change					-2.74	.02	1.4	1.8
Perceived Stress Scale total score	.16	.03	.766	.56	5.59	< .001		
Life stress: Job change					2.09	.04	1.4	1.1
Fatigued or tired	.72	.32	.40	.13	2.31	.02		
Bond	-1.65	.47	-.55	.28	-3.50	.002		
Week 5								
The effect of PMS on mood	-1.77	.78	-.58	.27	-2.27	.04		
Abortion					-4.08	.001	2.2	2.5
Bond	-1.95	.59	-.67	.41	-3.28	.006		

Note. R^2 = Adjusted R^2. *d* = Cohen's *d*, or a measure of effect size. Since there are multiple formulas for calculating effect sizes for independent groups, $d^1 = M_1 - M_2 / sd_{pooled}$, where $sd_{pooled} = \sqrt{[(sd_1^2 + sd_2^2) / 2]}$, and $d^2 = t (n_1 + n_2) / [\sqrt{(df)}\ \sqrt{(n_1 n_2)}]$. The first effect size measure tends to be the most conservative estimate of effect size. The effect size calculator used for d^1 can be found at http://web.uccs.edu/lbecker/Psy590/es.htm. Note that d^2 was calculated in excel using the formula listed above.

PMS on mood, abortion, and bond with infant explained 65% of the total variance in depression *z*-scores, $R^2 = .65$, adjusted $R^2 = .57$, $F(3, 12) = 7.49$, $p = .004$.

Age, Perceived Stress Scale total score, job change, feeling fatigued or tired, and bond with infant explained 64% of the total variance in Week 1 elation total scores, $R^2 = .64$, adjusted $R^2 = .56$, $F(5, 22) = 7.91$, $p < .001$. In Week 5, the effect of PMS on mood, period regularity, the effect of puberty on mood, abortion, and bond with infant explained 87% of the total variance in elation total scores, $R^2 = .87$, adjusted $R^2 = .79$, $F(5, 8) = 10.53$, $p = .002$.

Past negative mood change in the postpartum period, Perceived Stress Scale total score, job change, feeling fatigued or tired, and bond with infant explained 75% of the total variance in Week 1 composite mood scores, $R^2 = .75$, adjusted $R^2 = .69$, $F(5, 21) = 12.80$, $p < .001$. In Week 5, the effect of PMS on mood, abortion, and bond with infant explained 78% of the total variance in composite mood scores, $R^2 = .78$, adjusted $R^2 = .72$, $F(3, 10) = 12.04$, $p = .001$.

Therefore, averaging across Week 1 and Week 5 postpartum, the composite mood scale accounted for more total variance than the depression *z*-scores or the elation total scores (77% compared to 66% and 76% respectively).

Predicting Week 5 Depression Scores with Week 1 Elation Scores

A bivariate regression analysis was performed with Week 5 depression *z*-scores as the dependent variable and Week 1 Elation Scale total scores as the independent variable. The model was not significant; therefore, early elation scores did not significantly predict later depression scores, $r(14) = -.39$, $p > .05$.

Supplemental Analyses

To further investigate the mechanism behind the significant finding of bond being predictive of all mood measures used in this study, a number of additional analyses were performed.

To determine if infant temperament was affecting bond as rated by the mother, an independent samples *t*-test was conducted comparing bond with infant (rated on a 5-point Likert-type scale from *very weak* to *very strong*) to the following dichotomous life stress question: Is your baby difficult to console or soothe? However, this was not found to be significant, $p > .05$.

A stepwise regression was performed with bond with infant as the dependent variable and times feeding and feeding length as independent variables. *R* for regression was significantly different from zero, $F(1, 30) = 10.58$, $p = .003$, with R^2 at .26, and adjusted R^2 at .23, indicating that 23% of the variability in bond with infant was predicted by length of feedings (in minutes). Length of feeding was the only variable that contributed unique variance and significantly predicted bond with infant, $t(30) = -3.25$, $p = .003$, indicating that women who spent more time feeding their infant rated their bond with their infant as *lower.* It is possible that women who had trouble feeding their babies had to spend more time trying to feed their babies, and these complications ultimately had a negative effect on the quality of the bond. In this scenario, length of feeding would mediate the relationship between problems feeding baby and bond with infant. The raw correlation between problems feeding baby and bond with infant started out significant, $r(31) = -.36$, $p = .04$, but after partialing out length of feeding scores the correlation was no longer significant, $r(28) = -.29$, $p > .05$. Therefore, length of feeding is a partial

mediator of the relationship between problems feeding baby and bond, since the relationship between problems feeding baby and bond was diminished, but not zero, after the mediator was in the equation (Tabachnick & Fidell, 2007).

Other Variables of Interest

Although pregnancy complications were examined in the main mood analyses, the question was dichotomous (yes or no) and specific complications during pregnancy were not examined. To further examine whether specific types of complications contributed to depression, four independent samples *t*-tests were conducted comparing Week 1 depression scores (combined BDI-II and EPDS *z*-scores) and the following binary variables: instrumental delivery (e.g., forceps), Caesarean section, induced labour, and oxytocin use (premature contractions and postpartum bleeding were excluded due to the small number of participants endorsing those items). Only the *t*-test comparing depression scores and Caesarean section was found to be significant, $t(30) = -4.52$, $p < .001$. Women who had a Caesarean section during their recent delivery had higher depression scores ($M = 1.10$, $SD = .96$) than women who did not have a Caesarean section ($M = -0.31$, $SD = .66$). For the sake of reference, the mean for women who did not have a Caesarean section was 6.53 ($SD = 3.81$) versus 13.01 ($SD = 4.29$) for those who did using the EPDS and 8.69 ($SD = 3.64$) and 16.2 ($SD = 5.78$) for the BDI-II respectively. However, the *t*-test comparing Week 5 depression scores and Caesarean section was only marginally significant, $t(15) = -2.06$, $p = .057$. It is unclear whether women who had Caesarean sections did so as an elective surgical procedure or as an emergency procedure. Emergency procedures may have been related to additional problems or concerns that were not measured and likely caused a great deal of stress. In

fact, women who had a Caesarean section had significantly higher perceived stress scores in Week 1 ($M = 27.83$, $SD = 4.88$) than women who did not ($M = 19.13$, $SD = 7.09$), t (27) = -2.82, $p = .009$.

A t-test comparing Week 1 Elation Scale total scores for women who had a Caesarean section and women who did not was also found to be significant, t (29) = 3.83, $p = .001$. Women who had a Caesarean section had lower elation scores ($M = 45.33$, $SD = 6.19$) than women who did not have a Caesarean section ($M = 63.56$, $SD = 11.17$). In this case, the results were still significant for Week 5, t (13) = 2.78, $p = .02$, even though only two women were included that experienced a Caesarean section.

Another variable of interest was body satisfaction, or how women felt about their bodies at the time they completed the survey, rated on a Likert-type scale from *extremely satisfied* (1) to *extremely dissatisfied* (7). Body satisfaction was only marginally correlated with depression z-scores at Week 1, r (29) = .34, $p = .06$, suggesting that women who are dissatisfied with their bodies may have higher depression scores, or that women who are depressed have more negative appraisals and rate their bodies more negatively. However, there are other variables which confound the relationship between body satisfaction and depression. For instance, body dissatisfaction increased significantly with age, r (29) = .56, $p < .01$, and number of times pregnant, r (30) = .34, $p = .05$. Thus, older women are likely to have been pregnant more times than younger women and may have experienced several increases and decreases in their weight over the years, affecting body dissatisfaction.

Discussion

The present study was conducted to examine the effects of a variety of demographic, reproductive, and psychosocial variables on mood change in the postpartum period. The findings showed that the following variables were significant predictors of depression at Week 1 postpartum: history of abortion, past negative mood change in the postpartum period, higher levels of perceived stress, marital dissatisfaction, problems feeding baby, less sleep than usual, and a less strong bond with infant. At Week 5 postpartum, both history of abortion and weaker bond with infant continued to be significant predictors of depression, as well as previous negative effects of PMS on mood.

Many of the variables found to be significant predictors of depression were also significant predictors of elation at Week 1 postpartum, including lower levels of perceived stress, seldom feeling fatigued or tired, stronger bond with infant, as well as younger age and experiencing job change. At Week 5 postpartum, stronger bond with infant was still a significant predictor of elation, as well as negative history of abortion, positive effect of puberty on mood, period regularity, and the positive effect of PMS on mood.

Many of the significant findings for both depression and elation were replicated using the composite mood scale. Significant predictors of high composite mood scores (i.e., more depressed) in Week 1 postpartum were past negative mood change in the postpartum period, higher levels of perceived stress, not experiencing a job change, often feeling fatigued or tired, and weaker bond with infant. Weaker bond with infant continued to be a significant predictor of higher composite mood scores during Week 5,

as well as history of abortion, negative effect of puberty on mood, and the negative effect of PMS on mood.

Contrary to predictions, Elation Scale total scores during the first week postpartum did not predict later depression scores at the fourth week postpartum. In addition, length of feeding was found to predict bond with infant, and partially mediate the relationship between having problems feeding baby and weaker bond with the baby. Lastly, having a Caesarean section was found to be a significant positive predictor of depression and a negative predictor of elation in Week 1 as well as Week 5 (although only marginally for depression scores).

It is important to recognize that due to the large number of *t*-tests and regression analyses conducted, there is an increased risk of Type I errors, or rejecting the null hypothesis when it is in fact true. However, many of the findings reported in this study were significant at the .01 and .001 level, including past negative mood change in the postpartum period (Week 1 depression), perceived stress (Week 1 depression and Week 1 composite mood), bond with infant (Week 1 and Week 5 depression, Week 5 elation, Week 1 and Week 5 composite mood), history of abortion (Week 5 depression, Week 5 elation, and Week 5 composite mood), and feeling fatigued or tired (Week 1 elation). Therefore, even if a Bonferroni correction was applied, many of these findings would still be significant. Some of the variables which may be at greater risk of being attributable to a Type I error include marital dissatisfaction (Week 1 depression), less sleep than usual (Week 1 depression), younger age (Week 1 elation), negative effect of PMS on mood (Week 5 depression and Week 5 composite mood), period regularity (Week 5 elation), and experiencing job change (Week 1 composite mood). However, the relationships for

many variables were replicated across different mood measures (i.e., elation, depression, and the composite mood scale). In addition, some variables had higher *p*-values in Week 1 compared to Week 5, where the sample size was much smaller.

Depression Hypotheses

In terms of demographic variables, it was hypothesized that higher depression scores would be related to single status, younger age, and less education. Marital status could not be examined because all 33 participants were in a relationship, so it is unclear whether relationship status was associated with depression scores (as observed by Lane et al., 1997). Contrary to the findings of Paykel et al. (1980), younger age was not found to be a significant predictor of depression *z*-scores. The correlation between age and depression, although small (see Table 11), suggests that older age was associated with higher depression *z*-scores. Finally, it was hypothesized that less education would be associated with higher depression scores. Contrary to the findings of Lane et al. (1997), the correlation between education and depression *z*-scores indicated there is little, if any, relationship between the two variables in this sample. Lane et al. found that that failure to obtain school qualifications was associated with higher EPDS scores; however it is unclear whether school qualifications refers to whether or not someone received a high school diploma, or a higher level of education. The expected relationship between education and depression may not have been found because the current sample was highly educated, with 66.6% having at least some university education. However, other researchers have found no link between depression and education (Stowe & Nemeroff, 1995) or that higher levels of education predicted depression (Yonkers et al., 2001).

In terms of reproductive variables, it was hypothesized that younger age at menarche and irregular menstrual periods would be associated with higher depression scores. Contrary to the findings of Harlow et al. (2004), age at menarche and period regularity were not significant predictors of depression. The correlation between age at menarche and depression scores indicated little relationship between the two variables. In addition, the correlation between having a regular period and depression scores was not in the hypothesized direction, indicating that women who responded "mostly true" to having a regular period had higher depression scores, and women who responded "mostly false" had lower depression scores.

The presence of PMS symptoms was hypothesized to be related to higher depression scores (see Bloch et al., 2005; Bloch et al., 2006; Burt & Stein, 2002; Steiner et al., 2003). Although presence of PMS symptoms was not a significant predictor of depression, the correlation between PMS symptoms and depression scores ($r = .16$) was in the hypothesized direction, indicating that women who strongly agreed that they have had problems with PMS had higher depression scores. In addition, the effect of PMS on mood was found to be a significant predictor of depression at Week 5, with women who said PMS affected their mood negatively having higher depression scores. The significant effect of PMS on mood was again repeated for the composite mood scores at Week 5 postpartum, along with the effect of puberty on mood, with women who stated that going through puberty affected their mood very negatively having higher depression scores than women who stated that going through puberty affected them in no way at all. These results suggest that simply going through puberty or having a history of PMS are not necessarily related to an increased risk of developing postpartum depression, but some

women appear to be susceptible to negative mood fluctuations at these times and seem to be at increased risk for developing postpartum depression.

Having a positive history of personal and family mental illness was hypothesized to be associated with increased depression scores. Consistent with previous findings (Bloch et al., 2000; Freeman et al., 2002; Sharma, 2005; Watson et al., 1984), having experienced past negative mood change in the postpartum period was a significant predictor of depression in Week 1 and composite mood scores in Week 1. Although the *t*-test revealed no significant effect of past episode of depression on depression scores, the correlation ($r = .22$) was in the hypothesized direction, indicating that women who had a past history of depression had higher depression scores than women who did not have a history of depression. Contrary to the hypothesis, history of family mental illness was not a significant predictor of depression, and the correlation suggests that there is no relationship between the two variables in this sample.

Having experienced previous childbirths, current unplanned pregnancy, having a prior abortion, having a prior miscarriage, and current pregnancy complications were all expected to be associated with higher depression scores. Contrary to Nielsen Forman et al. (2000), having previous childbirths was not a significant predictor of depression, and there was little relationship between the two variables in this sample. Contrary to Lane et al. (1997), having an unplanned pregnancy was not a significant predictor of higher depression scores. The correlation between these variables was not in the hypothesized direction, with women who described their pregnancy as planned having higher depression scores than women who described their pregnancy as unplanned. However, approximately a third of the sample classified their pregnancy as unplanned, but only one

individual described their pregnancy as unwanted. Women who stated that their current pregnancy was unplanned likely felt similarly about their pregnancy as women who stated that their pregnancy was planned. Thus, a third variable is likely causing the relationship between having a planned pregnancy and higher depression scores. For example, women who stated that their current pregnancy was planned may have been older and more likely to have experienced a past episode of depression or postpartum depression.

Consistent with the findings of Josefsson et al. (2002), history of abortion was found to be only a marginally significant predictor of depression (due to unequal variances), although this finding did reach significance using the EPDS alone as the dependent measure. Additionally, there was a significant effect for abortion in Week 5 for both depression scores and composite mood scores. Having a history of abortion may make the postpartum period a particularly difficult time for some women. Women with a history of abortion may feel guilty over terminating a past pregnancy when they are in the process of giving life, or it may bring back difficult memories for some women. Alternatively, women with a history of abortion may not feel guilt or conflicting feelings about a past abortion. Instead, women who have abortions may be more prone to postpartum depression due to correlated personality-style variables such as lower religiosity and higher aspirations for academic achievement (Costa, Jessor, & Donovan, 1987).

Although miscarriage was not found to be a significant predictor of depression, the correlation between these variables was in the hypothesized direction, with women who had a history of miscarriage having higher depression scores (see Josefsson et al.,

2002). Finally, contrary to the findings of Josefsson et al. (2002), pregnancy complications were not a significant predictor of depression scores. However, the correlation between pregnancy complications and depression scores was in the hypothesized direction ($r = .20$) and showed that women who experienced pregnancy complications had higher depression scores.

Specific types of pregnancy complications were also measured in this study. Instrumental delivery and induced labour were found to have little relationship with depression, whereas there was a small positive correlation ($r = .17$) between being given oxytocin and depression scores. Participants also listed additional pregnancy complications under the "other" category. These included vaginal tearing, oxytocin given after delivery to prevent hemorrhage (a standard of care), low lying placenta, and meconium ("a dark greenish mass that accumulates in the bowel during fetal life and is discharged shortly after birth;" Merriam-Webster Online Dictionary, 2009). Although it is not clear what exactly the complication was surrounding meconium, it may be the in utero passage of meconium, which occurs in 7-22% of pregnancies and is more common when gestation goes beyond term (or 37 weeks of pregnancy; Miller, 2001). Postpartum pre-eclampsia was also listed, which is defined by Merriam-Webster's Online Dictionary as "a serious condition developing in late pregnancy that is characterized by a sudden rise in blood pressure, excessive weight gain, generalized edema, proteinuria, severe headache, and visual disturbances and that may result in eclampsia if untreated" (Merriam-Webster Online Dictionary, 2009).

The pregnancy complication most associated with depression scores was having a Caesarean section. Consistent with findings by Josefsson et al. (2002), having a

Caesarean section was found to be associated with higher depression scores in Week 1, but this difference was only marginally significant at Week 5 (p = .057). However, with a larger sample size in Week 5, this finding probably would have been significant. As mentioned earlier, women who had Caesarean sections had significantly higher perceived stress scores in Week 1 compared to women who did not, and high levels of perceived stress were found to significantly predict depression scores at Week 1.

In terms of psychosocial variables, it was hypothesized that high levels of perceived stress, marital dissatisfaction, and lack of perceived social support would be associated with higher depression scores. Consistent with the findings of Gotlib et al. (1991), high levels of perceived stress was found to be a significant predictor of depression and composite mood scores at Week 1 postpartum, but not at Week 5. Consistent with past research (Beck, 2002; Gotlib et al., 1991; Paykel et al., 1980), marital dissatisfaction was a significant predictor of depression scores in Week 1 postpartum (r = -.50). Marital dissatisfaction at Week 5 postpartum was not a significant predictor of depression; however, the correlation between Dyadic Adjustment Scale total scores and depression scores was in the hypothesized direction (r = -.25). Finally, in contrast to previous findings (Beck, 2002; Paykel et al., 1980), perceived social support was not a significant predictor of depression in the regression analysis performed with Perceived Stress Scale scores and Dyadic Adjustment Scale scores. However, the correlation between the Multidimensional Scale of Perceived Social Support scores and depression scores in Week 1 was significant and in the hypothesized direction (r = -.36), indicating that individuals with lower perceived social support scores had higher depression scores. It is quite possible that the small sample size attenuated these analyses.

Although not statistically significant, all of the associations were in the expected directions. The mean Multidimensional Scale of Perceived Social Support score was very high and there was relatively little variance. This attenuation or restriction in range may also have decreased the likelihood of finding a significant result.

Based on the findings reported by Beck (2002), life stress was hypothesized to be a risk factor for developing postpartum depression. However, financial problems and unemployment were not found to be significant predictors of depression scores and the correlations between these variables and depression scores were not in the hypothesized direction. The correlation between financial problems and depression scores was very small and in the opposite direction as hypothesized, indicating that people without financial problems had higher depression scores. The correlation between unemployment and depression scores indicated there was little relationship between these two variables at all. Similarly, experiencing a job change was related to lower depression scores, not higher scores as expected. There was also little relationship between infant health problems and depression scores, contrary to expectations. However, as expected, mothers who reported their babies were difficult to soothe had higher depression scores (although not significantly, $r = .16$). Having problems feeding the baby was the only life stress variable that significantly predicted depression scores; women who had problems feeding their baby had significantly higher depression scores than women who did not have problems feeding their baby ($r = .41$). This is likely due to the fact that based on correlations, women who had problems feeding their baby rated their bond with their baby as lower, and lower ratings of bond significantly predicted depression scores at Week 1.

Previous studies have shown that sleep disturbance in the postpartum period predicted depression or "the blues" (Dennis & Ross, 2005; Lee et al., 2000; Wilkie & Shapiro, 1992). Contrary to the findings of Dennis and Ross (2005), how well mothers perceived their baby to have slept was not a significant predictor of depression scores. The correlation, although small, was not in the hypothesized direction and showed that mothers of babies that were rated as sleeping very well had higher depression scores (r = -.10). Even if most babies were rated as sleeping well, based on the sleep pattern of the baby and how often the mother had to feed the baby, the mother's sleep could still have been negatively impacted leading to higher depression scores.

Times per night woken up to feed baby was also not a significant predictor of depression scores, but the correlation was in the expected direction, with women who got woken up many times per night to feed their babies having higher depression scores than women who were woken up fewer times per night (r = .12). Similarly, hours of sleep per night was not a significant predictor of depression, but the correlation was in the hypothesized direction, with women who got fewer hours of sleep having higher depression scores (r = -.32). Although not a significant predictor of depression, women who disagreed that their baby's sleep pattern allowed them to get a reasonable amount of sleep had higher depression scores, and the correlation was marginally significant (p = .07). The one sleep-related variable that was found to predict depression scores was the question inquiring about the amount of sleep attained compared to usual. Women who reported getting less sleep than usual had higher depression scores than women who reported getting a little less sleep than usual or an average amount of sleep. Although most women experience sleep loss in the postpartum period, the difference between the

amount of sleep received before and after the newborn is critical. In this case, the greater the change from pre-partum sleep levels, the greater the risk of higher depression scores.

Finally, although Corwin et al. (2005) found that postpartum fatigue significantly correlated with depression scores, frequency of feeling tired or fatigued was not a significant predictor of depression in the current study. However, the correlation between frequency of feeling tired or fatigued and depression scores was in the hypothesized direction, with women who often felt fatigued or tired having higher depression scores than women who rarely felt fatigued or tired ($r = .28$). Thus, 5 out of the 6 sleep-related variables were in the hypothesized direction, but only "amount of sleep compared to usual" was found to be a significant predictor of depression. However, since all of the questions were of a similar nature, it can be concluded that, in the present study, sleep disturbance in the postpartum period is related to depression. However, it should be noted that sleep disturbance is also a symptom of depression.

Lastly, consistent with the findings of Taylor et al. (2005), a weaker bond with the infant was found to be a significant predictor of depression scores at both Week 1 and Week 5. The relationship between bond and mood scores will be explored in more detail below.

Elation Hypotheses

Based on the findings by Lane et al. (1997), it was hypothesized that higher Elation Scale scores would be related to single status, unplanned pregnancy, and bottle-feeding. As mentioned earlier, marital status could not be examined since all participants listed themselves as being in a relationship at Week 1 and only one person was listed as separated or divorced at Week 5. Bottle-feeding was also not examined since the majority

of the sample breastfed their babies. Finally, unplanned pregnancy was not found to be a significant predictor of elation. The correlation between planned pregnancy and elation scores in Week 1 was small (r = -.19) and in the opposite direction than expected, with women who said their current pregnancy was not planned having slightly higher elation scores.

Other variables hypothesized to be related to high elation scores were sleep disturbance and strong bond with infant. Sleep disturbance has been implicated in the development of both postpartum hypomania and psychosis (Buysse et al., 2006; Sharma & Mazmanian, 2003; Wu & Bunney, 1990). The frequency of feeling tired or fatigued was found to be a significant predictor of Week 1 elation scores, indicating that women who seldom felt tired or fatigued had higher elation scores than women who often felt tired or fatigued. This finding in some ways contradicts past research, which suggests that disruption of sleep can precipitate hypomania. It was expected that women who said they often felt tired or fatigued would have higher elation scores.

The finding that women who seldom felt tired or fatigued had higher elation scores could be interpreted in various ways. One possibility is that women who seldom felt fatigued or tired were getting an adequate amount of sleep (possibly due to the help of their partner with the baby) and had higher elation scores due to happiness and not hypomania. The second possibility is that women who seldom felt fatigued or tired were exhibiting a symptom of hypomania, a decreased need for sleep, and were therefore scoring higher on the elation scale. In fact, on question six on the Highs Scale (Have you felt the need for less sleep?), six women answered "yes a little". In addition, all six of these women answered "less sleep than usual" to the question assessing how much sleep

they were getting on average (ranging from less sleep than usual to more sleep than usual on a Likert-type scale). Thus, the second interpretation seems more plausible.

Finally, based on the findings by Heron et al. (2005), women with higher elation scores were hypothesized to have a stronger bond with their infant compared to women with lower elation scores. Consistent with past research, bond with infant was found to be a significant predictor of both Week 1 and Week 5 elation scores, with women who rated their bond as very strong having higher elation scores. Heron et al. theorized that postpartum elation may be beneficial from an evolutionary perspective, by promoting early attachment that may buffer against postpartum depression.

Of the five variables hypothesized to be related to high elation scores, frequency of feeling fatigued or tired and strong bond with infant were the two that were found to be significant predictors of postpartum elation. However, all the variables used in the depression analyses were also explored to see if there were any other variables which significantly predicted elation scores.

In Week 1 postpartum, younger age was found to marginally predict elation scores ($p = .06$). In addition, lower Perceived Stress Scale scores predicted higher elation scores. Higher scores on the Perceived Stress Scale were found to predict higher depression scores and lower scores on the Perceived Stress Scale were found to predict higher elation scores. Furthermore, women who had experienced a job change had significantly higher elation scores. Although we asked participants at the beginning of the questionnaire whether they were currently employed (i.e., yes, no, retired, or maternity leave) and also what their overall employment situation was, participants may have indicated that they experienced a job change based on taking time off work to have a

baby. In addition, women may have reduced their hours from full time to part time or decided to become a stay at home parent. Although it is difficult to surmise the circumstances of the women who indicated they experienced a job change, it is possible that this change was associated with less stress and therefore higher elation scores. However, only four individuals experienced a job change, and one of these individuals had the highest elation score received in the sample. Therefore, this finding needs to be replicated with a larger sample size.

In Week 5 postpartum, a positive effect of PMS on mood, having a regular period, a positive effect of puberty on mood, and a negative history of abortion all predicted higher elation scores. As mentioned earlier, some women appear to be more susceptible to negative mood fluctuations during puberty and across the menstrual cycle, which may increase the risk for developing postpartum depression. Bloch et al. (2005) found that the prevalence of PMDD was significantly greater in women who developed postpartum depression; therefore, this may also be true for women with a history of PMS (the less severe form of PMDD). Thus, women who have not experienced any negative mood fluctuations at puberty or across the menstrual cycle may be less likely to develop postpartum depression. Furthermore, women with a regular menstrual cycle may be less prone to experiencing negative mood changes than women with irregular menstrual cycles. Lastly, a negative history of abortion significantly predicted higher elation scores, which is consistent with the finding that a positive history of abortion significantly predicted higher depression scores.

The final hypothesis was that women who experienced postpartum elation at Week 1 would have a greater risk of developing postpartum depression at Week 5, as

established by Glover et al. (1994). In the present study early elation scores did not significantly predict later depression scores. The study by Glover et al. had a sample size of 119 women and found that 11% scored above the cut-off score of eight on the Highs Scale at Week 1 postpartum, whereas the present study had a sample size of only 33 women and had only one woman score an eight on the Highs Scale. However, if you also include the three women who scored a seven on the Highs Scale then 14% of the current sample scored close to the cut-off score. It is difficult to assess if these individuals were more likely to score high on the EPDS at Week 5 since only two of the four women with an elevated score on the Highs Scale completed the follow-up questionnaire.

Composite Mood Scores as an Outcome Variable

In the present study mood was assessed by looking at depression and elation separately, and also by using a continuous measure of mood, the composite mood scale. Below are the significant findings using the composite mood scale and how they relate to both depression and elation findings.

In Week 1 postpartum, a history of past negative mood change in the postpartum period was associated with negative mood change on the composite mood scale, which is consistent with Week 1 depression findings. Similarly, high levels of perceived stress at Week 1 were associated with negative mood change, which was also a highly significant finding for both elation and depression in Week 1. In fact, the R^2 value was the highest for the composite mood scale and perceived stress, indicating that more of the variability in composite mood scores was accounted for by the Perceived Stress Scale than by using the depression *z*-scores or elation scores separately as dependent measures. This suggests

that using a continuous measure of mood maximizes predictive ability compared to using two distinct mood scales for elation and depression.

Experiencing job change was associated with positive mood change on the composite mood scale, which was consistent with Week 1 elation findings. Negative mood change on the composite mood scale was associated with often feeling tired or fatigued, which was consistent with the Week 1 finding that women who seldom felt tired or fatigued had higher elation scores. The last Week 1 variable that significantly predicted composite mood scores was bond with infant. A weaker bond was associated with negative mood change on the composite mood scale, which is consistent with both elation and depression findings. Women who rated their bond with their infant as weaker were found to have higher depression scores and women who rated their bond as stronger were found to have higher elation scores.

Weaker bond with infant was also a significant predictor of negative mood change on the composite mood scale at Week 5 postpartum. In fact, bond with infant was the only variable which was a significant predictor of all three measures of mood at both Week 1 and Week 5, making it the most consistent or replicated finding. In addition, history of abortion was significantly associated with negative mood change on the composite mood scale at Week 5, which is consistent with both Week 1 and Week 5 depression findings. Finally, a negative effect of puberty on mood and a negative effect of PMS on mood were also significantly related to negative mood change on the composite mood scale. These findings are also consistent with Week 5 depression findings and Week 5 elation findings.

The effect sizes were very similar when comparing significant findings across the three outcome variables, with higher effect sizes for some variables using the composite mood scale and higher effect sizes for other variables using either the depression *z*-scores or the elation scores. Since many of the findings were replicated across the various mood measures it seems as though depression and elation can be measured effectively on one continuous scale.

Are the Predictors of Elation and Depression Similar or Different?

Many of the same variables predicted both depression and elation scores, just in opposite directions. For instance, a positive history of having an abortion was related to higher depression scores and a negative history of abortion was related to higher elation scores. Similarly, women with higher levels of perceived stress had higher depression scores and women with lower levels of perceived stress had higher elation scores. The same can be said for bond with infant and the effect of PMS on mood. Finally, sleep characteristics in the postpartum period were found to predict both elation and depression scores, albeit different variables. Women getting less sleep than usual had higher depression scores, and women who seldom felt tired or fatigued had higher elation scores. Therefore, the large majority of predictors of elation and depression are the same, although there were some unique predictors of both depression and elation (e.g., past negative mood change, marital dissatisfaction, problems feeding baby, age, job change, and the effect of puberty on mood) .

It is difficult to discern if the Elation Scale that was created for the purpose of this study is simply measuring "normal" happiness in relation to having a baby (i.e., happiness that can occur due to a non-hormonal event) or sub-threshold hypomania.

Many new mothers can be described by friends and family as being elated, but this does not mean they are hypomanic. There may be two different populations of women who are scoring high on the Elation Scale, women who are elated after childbirth but not in a "pathological" way and women who are scoring high and are experiencing hypomania. For example, the Highs Scale and the Elation Scale were significantly positively correlated, but some women scored high on the Elation Scale and relatively low on the Highs Scale and some women scored high on both scales. Thus, the Highs Scale may be useful to distinguish between individuals who are scoring high on the Elation Scale. Elation would become more of a clinical focus if there were a cluster of symptoms indicative of hypomania. The criteria for a hypomanic episode in the *DSM-IV-TR* require that an individual have three of more of the following symptoms: inflated self-esteem or grandiosity, decreased need for sleep, more talkative than usual or pressure to keep talking, flight of ideas, distractibility, increase in goal-directed activity, and excessive involvement in pleasurable activities (American Psychiatric Association, 2000).

Although postpartum depression has received a lot of attention from both researchers and the media over the last decade especially, there is much less research on and attention to postpartum elation and hypomania. The results of this study and similar studies help to identify "at-risk" individuals by accumulating a list of risk factors for developing a postpartum mood disorder. Hopefully these findings will bring awareness to postpartum elation and hypomania, since it tends to be overlooked as just a natural consequence of childbirth. If women are educated about all forms of mood change in the postpartum period, and not just postpartum depression, they may be more cognizant of symptoms and be more likely to reach out for services. Women with bipolar disorder in

particular should be followed carefully through the postpartum period by their family physician, psychologist, or psychiatrist since they are at an increased risk of developing a mood episode, especially if they have experienced one in past pregnancies.

Relationship between Hormones and Mood Episodes in the Postpartum Period

Although reproductive variables were examined in the present study, we were not able to measure hormone levels directly. As mentioned earlier, Douma et al. (2005) found that sudden estrogen withdrawal (e.g., the postpartum period) and fluctuating estrogen levels (e.g., puberty and PMS) were significantly correlated with mood disturbance. This study found that women stating PMS affected their mood very negatively had higher postpartum depression scores than women stating that PMS affected their mood less negatively. Also, women who stated that going through puberty affected their mood more negatively had lower elation scores. Therefore, some women may be more sensitive to fluctuating estrogen levels and have an increased risk of developing depression during puberty, PMS, and after childbirth.

Fluctuating hormone levels have also been hypothesized to worsen mood symptoms during major reproductive events in women with bipolar disorder. Freeman et al. (2002) examined mood symptoms during menopause in women who used Hormone Replacement Therapy (HRT), and women who did not. In this study HRT consisted of either conjugated estrogen or combined estradiol and medroxyprogesterone. Women who were not using HRT were found to be significantly more likely to report that their symptoms worsened during either perimenopause or menopause than women who did use HRT. Therefore, at least in this study HRT acted like a mood stabilizer, similar to the

research showing the successful use of estrogen therapy to treat postpartum, perimenopausal, and postmenopausal depression (Douma et al., 2005).

A hypothesized mechanism behind the effect of estrogen on mood is through the dopaminergic system. Wieck et al. (2003) predicted that hypothalamic dopamine receptor function would be more sensitive to changes in ovarian hormone levels during the menstrual cycle in women with a history of bipolar disorder. Eight women with a diagnosis of bipolar disorder and who had experienced a mood episode within six months after childbirth but were currently well were compared to nine control subjects with no psychiatric history. Hypothalamic dopamine receptor function was measured in the early follicular phase of the menstrual cycle when plasma concentrations of oestrogen and progesterone are low, and in the mid-luteal phase when they are relatively higher, using the APO-GH test (the growth hormone response to the dopamine agonist apomorphine). The results of this study showed that APO-GH responses were similar between the two groups during the follicular phase of the menstrual phase, but the bipolar group had significantly greater APO-GH responses in the mid-luteal phase of the menstrual cycle. Therefore, women with bipolar disorder had increased dopaminergic receptor sensitivity in the luteal phase of the menstrual cycle, suggesting that these systems were more sensitive to changes in female sex hormones than in the control women. Thus, fluctuating estrogen levels have an impact on the dopaminergic system, which may help to explain the development of mood change in the postpartum period.

Oxytocin and Bonding

The bond between mother and baby can be seen early in the postpartum period through behaviours such as proximity seeking, gaze, motherese (i.e., baby talk), and

touch. Oxytocin is known to be involved with lactation and in uterine contractions during labour, but it is also linked to early bonding behaviour between mother and baby (Feldman, Weller, Zagoory-Sharon, & Levine, 2007). Previous animal research has shown that oxytocin knockout mice have deficits in maternal bonding behaviour such as lower pup retrieval and pup licking (Pedersen, Vadlamudi, Boccia, & Amico, 2006). Additional studies have shown that after delivery, oxytocin release is stimulated by contact between mother and baby (Feldman et al., 2007).

Feldman et al. (2007) further examined the relationship between oxytocin and maternal bonding by conducting a longitudinal study in which oxytocin levels were measured in 62 pregnant women in the first and third trimester of pregnancy as well as in the first month postpartum. Bonding was assessed by measuring both maternal behaviours (e.g., gaze, affect, touch, and vocalization) as well as maternal representations (bonding-related thoughts, feelings, and behaviours as measured by the Yale Inventory of Parent Thought and Action). Several important results were found in this study. First, oxytocin levels were found to be consistent throughout pregnancy. Secondly, oxytocin was associated with both maternal behavioural measures as well as maternal representations. Lastly, in the first month postpartum oxytocin was positively associated with maternal behaviour, whereas cortisol was negatively associated with maternal behavior.

Based on the findings of the present study, maternal bonding was associated with mood ratings. A previous study by Taylor et al. (2005), found that women who scored higher on the EPDS and Blues Scale at day three postpartum showed lower bonding ratings and women with higher scores on the Highs Scale showed higher bonding ratings.

These results complement the findings of the present study wherein women with higher depression scores rated the bond with their infant as lower, and women with higher elation scores rated the bond with their infant as higher or stronger.

As previously stated, Feldman et al. (2007) found that oxytocin was positively associated with maternal behaviour and cortisol was negatively associated with maternal behaviour. Previous research has shown that cortisol levels are higher in the "blues" and lower in the "highs" (Taylor et al., 2005). Interestingly, the present study showed that women who scored higher on the depression scales had higher levels of perceived stress, whereas women who scored higher on the Elation Scale had lower levels of perceived stress. This suggests that depressed women likely had higher cortisol levels than elated women. Therefore, women who are depressed in the postpartum period may have higher cortisol levels which may interfere with maternal bonding behaviour and women who are elated may have lower levels of cortisol and higher levels of oxytocin to promote bonding behaviour. Clearly, more research is needed in this area to determine the individual and combined effects of hormones in the postpartum period on bonding behaviour and mood.

Another interesting finding in this study was the relationship between problems feeding baby and a decreased bond. The majority of women in the present study reported that they breastfed their babies and many women reported difficulties, including problems with milk production, sore nipples, pain during breastfeeding, and difficulty with the baby latching onto the breast. Righard and Alade (1992) found that a large majority of women have problems breastfeeding due to improper technique. In their study, breastfeeding technique was assessed after discharge from the hospital and women were randomly assigned to one of two groups: the nipple-sucking group (where incorrect

technique was not corrected) and a corrected group (in which mothers were given instruction on correct technique). The results of this study showed that women who switched from breastfeeding to bottle feeding within a month after delivery were 10 times more likely to be in the nipple-sucking group than in the corrected group. It is also possible that some women are more susceptible to breastfeeding difficulties and mood problems in the postpartum period due to a particular hormonal predisposition. That is, there could be a common hormonal cause.

Although oxytocin is involved with lactation, and has been shown to have an impact on maternal bonding, women who have difficulty breastfeeding likely experience greater stress, and are more likely to switch to bottle-feeding which may reduce oxytocin levels. In addition, breastfeeding associated with pain would most likely lead to negative affectivity and not increase feelings of positive affect that go along with higher ratings of bond with the infant.

Weaknesses and Strengths

The primary limitation of this study was the small sample size. Although the sample size was somewhat limited for the Week 1 analyses, it was a greater problem for the Week 5 analyses, since a large number of women did not complete the follow-up questionnaire. Therefore, power was decreased and fewer significant findings emerged for the Week 5 data. In addition, several variables had to be excluded from the analyses due to very small sample sizes (e.g., only two women stated that they did not breastfeed their baby). Finally, an increased sample size would permit more appropriate and more powerful statistical analyses (e.g., logistic regression).

Another potential concern is that our sample may not be highly generalizable. The majority of our sample resided in the Thunder Bay, Ontario area (65.9%) and therefore may not be representative to the rest of the Canadian population. Many participants were recruited from prenatal classes at the Thunder Bay Regional Health Sciences Centre. There may be differences between women who do and do not attend prenatal classes. In fact, an older study by Vinal (1982) found that women who did attend childbirth education programs were younger, slightly more educated, had been married for a shorter period of time, and this was more likely to be their first pregnancy compared to women who did not attend childbirth education programs. Therefore, the current sample of women may be atypical, in that they are highly educated, all in a relationship, and most likely from a higher socio-economic status.

A strength of the current study was the vast number of variables measured, which spanned across demographic, reproductive, and psychosocial domains. This allowed for a more general biopsychosocial model to be set forth when examining predictors of mood change instead of a more narrow focus. Many previous studies have only examined subsets of the predictors that were included in the present study. However, due to the restricted sample size, the variables were analyzed in subsets instead of all together in a single analysis, as would be permitted with a larger sample size.

Another strong point in the present study was that the internal consistency reliability of the scales selected ranged from .81 to .96. Reliability estimates of .80 or greater are generally considered moderate to high (Murphy & Davidshofer, 2005). Similarly, the internal consistency reliability of the Elation Scale, which was created for the purpose of this study, was found to be very high (.94). The Elation Scale allowed us

to measure sub-threshold hypomania since this was a small, non-clinical sample, and we did not expect to find a large number of women fitting the criteria for hypomania.

The present study also used a continuous measure of mood in addition to separate measurements of depression and elation. In many studies depression and hypomania are measured as distinct clinical entities, which are categorical. For example, a woman either meets the diagnostic criteria for an episode of major depression or she does not. In the present study, use of a continuous measure of mood ensured that no information was lost and we could examine a broader range of mood scores.

Future Research

The next logical step in this research project would be to recruit more widely from different regions across Canada and across different socio-economic backgrounds. With a larger sample size, it would be interesting to compare the mean depression and elation scores as well as the percentage of women scoring above cut-off scores for the EPDS and Highs Scale across different regions of Canada. The basic goal of research in this area is to determine the regulatory processes involved in mood, in order to develop a set of risk factors for a wide range of clinical conditions (e.g., "the blues", postpartum depression, postpartum hypomania, and postpartum psychosis). By identifying these risk factors, researchers and clinicians are then able to apply this research in order to formulate plans for prevention or early intervention. High-risk women could then be monitored more closely during pregnancy and in the postpartum period for mood change and intervention plans could be developed ahead of time (e.g., medication regimens). Furthermore, many women are treated for postpartum depression without evaluating whether they may have

a bipolar diathesis. Therefore, careful assessment in the postpartum period may provide very important clues for the development of future mood episodes.

A large number of studies rely very heavily on self-report measures exclusively, including the present study. There are many problems with self-report measures, including the tendency for people to over-report or under-report symptoms. In addition, social desirability comes into play and women may choose the more socially desirable response. For instance, when women are asked to rate the level of bond they have with their infant it would be very socially undesirable to say "very weak bond." Therefore, it is important to use not only self-report measures but also observer and clinician ratings. Spousal ratings of marital satisfaction may be very useful to researchers as well as clinician-administered diagnostic interviews during the first month postpartum. Present research seems to rely very heavily on the use of screening instruments to measure mood in which depression or elation is inferred by the use of cut-off scores. Although these instruments have been shown to be reliable and valid, the use of other measures in addition to these measures would be preferable.

Future research could also examine key factors in distinguishing between "normal" elation caused from the joy of childbirth and the more serious postpartum hypomania, which is associated with functional impairment and may put the individual at risk for future mood episodes after childbirth. Specifically, on which days after childbirth do specific symptoms develop and how long do they last? There is also a massive gap in the literature surrounding the hormonal predictors of postpartum hypomania. Hormonal assays could be given to women in the first week postpartum to test various hormones and compare the levels between women who developed hypomania versus those who did

not. Other hormonal based research could look to see whether oxytocin levels are higher in women who are elated and lower in women who are depressed.

Another interesting research question would be, does estrogen therapy or combined estrogen and progesterone therapy in the immediate postpartum period reduce symptoms of hypomania? Hormone therapy could also be explored in the postpartum period using bipolar patients who had experienced more than one child birth, who are at an increased risk of developing a mood episode (whether depressive or manic). In addition, dopaminergic receptor sensitivity to sex steroids could also be studied to see if it predicts either the development of depression or hypomania in the postpartum period for women with and without a previous mood episode during this time. In fact, preliminary open trials have shown positive effects for sex steroids in the treatment of postpartum psychosis (Wieck et al., 2003).

In addition, there is very little research examining mixed states in the postpartum period. Women may be assessed for symptoms of the "blues" or postpartum depression, but it is very rare for women to be assessed for hypomania or mixed states. Past research has shown that many bipolar patients presenting during a depressive episode also have co-occurring manic symptoms (Bauer et al., 2005). Thus, it would be interesting to examine the differences between "pure" unipolar postpartum depression and bipolar depression (or depression in women with a diagnosis of bipolar disorder) to see if mixed states in the postpartum period are more common in bipolar women.

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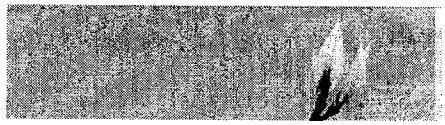
Appendix A

Recruitment Brochure

Lakehead
UNIVERSITY

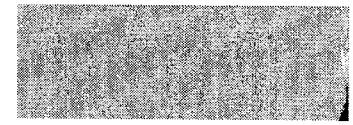


Are you about to give birth or have you recently given birth?

Are you over the age of 18 years old?

Lakehead University
955 Oliver Road, Thunder Bay
Ontario, Canada, P7B 5E1

Lakehead
UNIVERSITY



Motherhood

And

Mood

Research

Study

The purpose of this study is to evaluate how social stressors combine with reproductive history to influence mood shortly after delivery.

To participate you must be in your third trimester of pregnancy OR have given birth in the previous week.

Participation in this study involves filling out an initial questionnaire at the end of the first week postpartum. This takes approximately 30-45 minutes to complete. You will also be asked to complete a similar follow-up questionnaire one month later.

The questionnaires can be completed conveniently online (in the comfort of your own home), or we will send you a questionnaire package.

To show our thanks for completing the study, you will be entered in a random draw for a chance to win one of two $50 gift certificates.

Contact Information:

To participate in this study online please email:

Mothers@lakeheadu.ca

To receive a package of questionnaires, please email or call:

(807) 343- 8943

Thank you sincerely for your interest in this project.

This study is being conducted by:

Dr. Dwight Mazmanian
(Associate Professor of Psychology)

Dr. Kirsten Oinonen
(Associate Professor of Psychology)

Ms. Emily Russell
(B.Sc. Hons., M.A. Candidate)

If you have any questions, please do not hesitate to call or email:

Dr. Dwight Mazmanian
dwight.mazmanian@lakeheadu.ca
(807) 343-8257

OR

Emily Russell
erussell@lakeheadu.ca
(807) 343-8943

Appendix B

Motherhood and Mood Covering Letter

Dear Potential Participant,

Thank you for your interest in our study. The study is being conducted by Dr. Dwight Mazmanian (Associate Professor), Dr. Kirsten Oinonen (Associate Professor), and Emily Russell (M.A. Candidate) at Lakehead University. The goal of the study is to show how social stressors, such as lack of social support, affect mood shortly after the birth of your baby.

We are asking you to take part in a survey which will take you 25 to 45 minutes to complete. Then a follow-up survey will be sent to you about one month later. You can complete the survey online, through email, or we can send you a paper and pencil version through regular mail with a stamped and addressed return envelope.

There will be some personal questions on the survey about your reproductive history and your satisfaction with relationships. You will also be asked about social support, stress, and your mood. Although there are no known physical or psychological risks associated with taking part in this study, some of these questions may upset you. You can skip any questions that you don't wish to answer or that you don't understand. Your participation is voluntary. You may withdraw from the study at any time. You do not have to explain why you are stopping. There are many questions that may seem odd or unrelated. These items are included in the survey for accuracy reasons.

The information you give in the survey will be kept completely private. You will not need to give your name, but we ask for your year and month of birth. This will be used to link your first survey with the second survey. Your information will be kept in a secure manner at Lakehead University for at least five years as stated by university rules. Only the researchers will be able to see your information. If the research findings are published, there will be no information which could identify you. At the end of storage, all paper files will be shredded and all computer files will be deleted.

If you would like to take part in this study, please read and sign the attached Consent Form. Then complete the survey. To protect your identity, the consent form will be removed from the survey after it is finished. Thank you for taking part in the survey. Your name will be entered in a random draw for a chance to win one of two $50 gift certificates for the Intercity Mall or for Walmart for those who are outside of the Thunder Bay area.

Please keep this letter for your own records. You may contact the researchers at any time by emailing mothers@lakeheadu.ca. If you have any questions about this study please contact Emily Russell (erussell@lakeheadu.ca) or the supervisor of this study, Dr. Dwight Mazmanian (phone: (807) 343-8257, email: dwight.mazmanian@lakeheadu.ca). Other colleagues involved in this study include Dr. Kirsten Oinonen (Associate Professor

of Psychology at Lakehead University). If you have any questions about your rights as a research subject, please contact the Lakehead University Research Ethics Board at (807) 343-8283, or the Thunder Bay Regional Health Sciences Centre Research Ethics Office at (807) 684-6422.

Appendix C

Motherhood and Mood Consent Form

Thank you for your interest in our study. The study is being conducted by Dr. Dwight Mazmanian (Associate Professor), Dr. Kirsten Oinonen (Associate Professor), and Emily Russell (M.A. Candidate) at Lakehead University. The goal of the study is to show how social stressors, such as lack of social support, affect mood shortly after the birth of your baby.

We are asking you to take part in a survey which will take you 25 to 45 minutes to complete. Then a follow-up survey will be sent to you about one month later. You can complete the survey online, through email, or we can send you a paper and pencil version through regular mail with a stamped and addressed return envelope. There will be personal questions on the survey regarding your reproductive history and your satisfaction with relationships. You will also be asked about social support, stress, and your mood. Although there are no known physical or psychological risks associated with taking part in this study, some of these questions may upset you. You may omit any questions that you don't wish to answer, do not understand, or that make you uncomfortable. Your participation is voluntary. You may withdraw from the study at any time. You do not have to explain why you are stopping. There are many questions that may seem odd or unrelated. These items are included in the survey for accuracy reasons.

The information you give in the survey will be kept completely private. You will not need to give your name, but we ask for your year and month of birth. This will be used to link your first survey with the second survey. Your information will be kept in a secure manner at Lakehead University for at least five years as stated by university rules. Only the researchers will be able to see your information. If the research findings are published, there will be no information which could identify you. If you would like a summary of the results of this study, please provide your name and mailing address or email address to the researchers. A summary will be given to you upon completion of the study. To show our thanks for completing the survey, you will be entered in a random draw for a chance to win one of two $50 gift certificates for the Intercity Mall, or for Walmart for those who are outside of the Thunder Bay area.

I have read and understood the consent form, and I agree to take part in this study under these terms. I confirm that I am at least 18 years of age. I confirm that I am pregnant or have recently had a baby.

Printed Name	Signature	Today's Date

- You may contact the researchers at any time by emailing mothers@lakeheadu.ca. If you have any questions or concerns regarding this consent please contact Emily Russell (erussell@lakeheadu.ca) or the supervisor of this study, Dr. Dwight Mazmanian (phone: (807) 343-8257, email: dwight.mazmanian@lakeheadu.ca).
- Other colleagues involved in this study include Dr. Kirsten Oinonen (Associate Professor of Psychology at Lakehead University).

- If you have any questions about your rights as a research subject, please contact the Lakehead University Research Ethics Board at (807) 343-8283, or the Thunder Bay Regional Health Sciences Centre Research Ethics Office at (807) 684-6422.

Appendix D

Immediate Postpartum Questionnaire

General Information

1) Your month of Birth: _____

2) Your year of Birth: _____

3) Please answer the following questions about your delivery:

Date of Delivery (dd/mm/yyyy):_____

Sex of infant(s):_____

Birth Weight(s): _____

4. a) Marital status:

Married/common law	☐	Widowed	☐	Dating	☐
Divorced/separated	☐	Single	☐	In a long-term relationship	☐

b) If you are in a marital or long-term relationship, how long have you been with your partner?

_____

5) What is your ethnic background?

Caucasian/White	☐	European	☐
African-Canadian/Black	☐	Middle Eastern	☐
Native-Canadian/Aboriginal	☐	East Indian	☐
Hispanic/Latino	☐	Asian	☐

Other (please specify): _____

6) What is your current city/town/or village of residence?_____

7) Are you currently employed?

Yes ☐ No ☐ Retired ☐ Maternity leave ☐

8) What is your overall employment situation?

Full Time ☐ Stay at home parent ☐

Part Time ☐ Disability pension ☐

Student ☐

9) What is the highest level of education that you have achieved?

Some high school ☐ Some university ☐

High school diploma ☐ Undergraduate degree ☐

Some college ☐ Master's degree ☐

College diploma ☐ Doctorate Degree ☐

10) How many times have you been pregnant? _____

11. a) How many biological children do you have? _____

b) How old are they? _____

12) Have you ever had an abortion?

Yes ☐ No ☐

13) Have you ever had a miscarriage?

Yes ☐ No ☐

14) In prior pregnancies, have you ever experienced any complications during or after delivery?

Yes ☐ No ☐ This is my first pregnancy ☐

15) For your current pregnancy, please check off any complications that you may have experienced:

Premature contractions ☐

Instrumental delivery (e.g., forceps) ☐

Caesarean section ☐

Induced labour ☐

Given Oxytocin ☐

Postpartum bleeding ☐

Other (please specify): _____

16) My baby was delivered:

At a hospital ☐

At home ☐

Other (please specify): _____

17) My baby was delivered by:

Family Physician ☐

Obstetrician ☐

Midwife ☐

Nurse ☐

Other (please specify): _____

18) Was your current pregnancy planned? Yes ☐ No ☐

19) Was the pregnancy unwanted? Yes ☐ No ☐

20) How are you currently feeding your infant? (Check all that apply)

Breastfeeding ☐

Bottle feeding (formula) ☐

Bottle feeding (breast-milk) ☐

21) On average, how many times in a 24-hour period do you feed your baby?

_____

22) How long does it usually take to feed your infant?

_____

23) Please rate the strength of your bond with your infant:

☐	☐	☐	☐	☐
Very weak bond	Weak bond	Average bond	Strong bond	Very strong bond

24) With past pregnancies, did you experience any type of negative mood change during the postpartum period?
(If this is your first pregnancy, please skip to question 28)

Yes ☐ No ☐ Unsure ☐

25) If yes, were you formally diagnosed with postpartum depression?

Yes ☐ No ☐

26) If yes, did you receive any treatment for your negative mood change?

Yes ☐ No ☐

27) With past pregnancies, did you ever experience an extreme positive mood change after delivery?

Yes ☐ No ☐

28) Have you had a past episode of depression (not associated with childbirth)?

Yes ☐ No ☐

(If no, please skip to question 32)

29) If YES, how many times have you been depressed? _____

30) If YES, at what age did the depression(s) occur? _____

31) If YES, what kind of treatment did you receive?

_____

32) Did you use anti-depressant medication?

Yes ☐ No ☐

33) Please list any prescription medication you are currently taking:

_____

_____

34) Please list any non-prescription medication you are currently taking (e.g., vitamins):

_____

_____

35) Did you take vitamins during your pregnancy?

Always ☐ Sometimes ☐ Never ☐

36) When did you first begin menstruating (i.e. get your period)?

Year: _____

Month: _____

37) I believe that going through puberty affected my mood: (Mark the best answer)

☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
Very Negatively	Slightly Negatively	In no way at all	Slightly Positively	Very Positively

38) Please rate the extent to which each of the following words describes your period, in general.

	Mostly True	Somewhat True	Somewhat False	Mostly False
Regular	☐	☐	☐	☐
Irregular	☐	☐	☐	☐
Relatively short	☐	☐	☐	☐
Relatively long	☐	☐	☐	☐
Trouble-free	☐	☐	☐	☐
Distressing and discomforting	☐	☐	☐	☐

39) On average, how many days does your period last for? _____

40) On average, what is the typical length of your menstrual cycle? (e.g., 28 days)

_____

41) Please rate the extent to which you agree to the following statement:
I have had significant trouble with premenstrual distress (PMS or problems right before my period):

Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

42) If you checked agree or strongly agree, please elaborate on your trouble with premenstrual distress (PMS):

_____

_____

_____

43) I believe that my premenstrual distress (PMS) affected my mood: (Mark the best answer)

Very Negatively	Slightly Negatively	In no way at all	Slightly Positively	Very Positively
0☐	1☐	2☐	3☐	4☐

44) Have you used oral contraceptives in the past (i.e. birth control pills)?

Yes ☐ No ☐

45) IF YES, how long did you continue to use oral contraceptives?

_____

46) IF YES, I believe that using oral contraceptives affected my mood: (circle the best answer)

Very Negatively	Slightly Negatively	In no way at all	Slightly Positively	Very Positively
0☐	1☐	2☐	3☐	4☐

47) Is there any history of mental or emotional illness in your close biological relatives?

Yes ☐ No ☐

48) If YES, please check all that apply:

Depression ☐

Bipolar disorder (or manic-depression) ☐

Anxiety disorders ☐

Schizophrenia ☐

Other (please specify):_____

49) I try to get at least some sleep every night

True ☐ False ☐

50) I have attended school at some time during my life

True ☐ False ☐

51) I have never had any hair on my head

True ☐ False ☐

52) I have never ridden in an automobile

True ☐ False ☐

Mood Scale

As you have recently had a baby, we would like to know how you are feeling. Please mark 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, all the time
☒ Yes most of the time
☐ No, not very often
☐ No, not at all

This would mean: "I've felt happy most of the time" during the past week. Please complete the other questions in the same way.
In the past 7 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 been anxious or worried for no 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 so unhappy that I have had difficulty sleeping
☐ Yes, most of the 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

Relationship Scale:

(Note: if you are not in a relationship please skip the next 32 items and proceed directly to the stress scale)

Most persons have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list.

	Always agree	Almost always agree	Occa-sionally disagree	Fre-quently disagree	Almost always disagree	Always disagree
1. Handling family finances	☐	☐	☐	☐	☐	☐
2. Matters of recreation	☐	☐	☐	☐	☐	☐
3. Religious matters	☐	☐	☐	☐	☐	☐
4. Demonstrations of affection	☐	☐	☐	☐	☐	☐
5. Friends	☐	☐	☐	☐	☐	☐
6. Sex relations	☐	☐	☐	☐	☐	☐
7. Conventionality (correct or proper behavior)	☐	☐	☐	☐	☐	☐
8. Philosophy of life	☐	☐	☐	☐	☐	☐
9. Ways of dealing with parents or in-laws	☐	☐	☐	☐	☐	☐
10. Aims, goals, and things believed important	☐	☐	☐	☐	☐	☐
11. Amount of time spent together	☐	☐	☐	☐	☐	☐
12. Making major decisions	☐	☐	☐	☐	☐	☐
13. Household tasks	☐	☐	☐	☐	☐	☐
14. Leisure time interests and activities	☐	☐	☐	☐	☐	☐
15. Career decisions	☐	☐	☐	☐	☐	☐

	All the time	Most of the time	More often than not	Occa-sionally	Rarely	Never
16. How often do you discuss or have you considered divorce, separation, or terminating your relationship?	☐	☐	☐	☐	☐	☐
17. How often do you or your mate leave the house after a fight?	☐	☐	☐	☐	☐	☐
18. In general, how often do you think that things between you and your partner are going well?	☐	☐	☐	☐	☐	☐

19. Do you confide in your mate?	☐	☐	☐	☐	☐	☐
20. Do you ever regret that you married? *(or lived together)*	☐	☐	☐	☐	☐	☐
21. How often do you and your partner quarrel?	☐	☐	☐	☐	☐	☐
22. How often do you and your mate "get on each other's nerves?"	☐	☐	☐	☐	☐	☐

	Every day	Almost Every day	Occa-sionally	Rarely	Never
23. Do you kiss your mate?	☐	☐	☐	☐	☐

	All of them	Most of them	Some of them	Very few of them	None of them
24. Do you and your mate engage in outside interests together?	☐	☐	☐	☐	☐

How often would you say the following events occur between you and your mate?

	Never	Less than once a month	Once or twice a month	Once or twice a week	Once a day	More often
25. Have a stimulating exchange of ideas	☐	☐	☐	☐	☐	☐
26. Laugh together	☐	☐	☐	☐	☐	☐
27. Calmly discuss something	☐	☐	☐	☐	☐	☐
28. Work together on a project	☐	☐	☐	☐	☐	☐

There are some things about which couples sometimes agree and sometime disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks (Check yes or no)

	Yes	No
29. Being too tired for sex	☐	☐
30. Not showing love	☐	☐

31. The boxes on the following line represent different degrees of happiness in your relationship. The middle point, "happy", represents the degree of happiness of most

relationships. Please check the box which best describes the degree of happiness, all things considered, of your relationship.

☐	☐	☐	☐	☐	☐	☐
Extremely Unhappy	Fairly Unhappy	A Little Unhappy	Happy	Very Happy	Extremely Happy	Perfect

32. Which of the following statements best describes how you feel about the future of your relationship? (please choose only 1)

☐ I want desperately for my relationship to succeed, and would go to almost any length to see that it does.

☐ I want very much for my relationship to succeed, and I'll do all I can to see that it does.

☐ I want very much for my relationship to succeed and I will do my fair share to see that it does.

☐ It would be nice if my relationship succeeded, but I can't do much more than I am doing now to help it succeed.

☐ It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going.

☐ My relationship can never succeed, and there is no more that I can do to keep the relationship going.

Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last week. In each case, you will be asked to indicate *how* often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

For each question choose from the following alternatives:
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

1. In the last week, how often have you been upset because of something that happened unexpectedly?
- ☐ never
- ☐ almost never
- ☐ sometimes
- ☐ fairly often
- ☐ very often

2. In the last week, how often have you felt that you were unable to control the important things in your life?
- ☐ never
- ☐ almost never
- ☐ sometimes
- ☐ fairly often
- ☐ very often

3. In the last week, how often have you felt nervous and "stressed"?
- ☐ never
- ☐ almost never
- ☐ sometimes
- ☐ fairly often
- ☐ very often

4. In the last week, how often have you dealt successfully with irritating life hassles?
- ☐ never
- ☐ almost never
- ☐ sometimes
- ☐ fairly often
- ☐ very often

5. In the last week, how often have you felt that you were effectively coping with important changes that were occurring in your life?
- ☐ never
- ☐ almost never
- ☐ sometimes
- ☐ fairly often
- ☐ very often

6. In the last week, how often have you felt confident about your ability to handle your personal problems?
- ☐ never
- ☐ almost never
- ☐ sometimes
- ☐ fairly often
- ☐ very often

7. In the last week, how often have you felt that things were going your way?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

8. In the last week, how often have you found that you could not cope with all the things that you had to do?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

9. In the last week, how often have you been able to control irritations in your life?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

10. In the last week, how often have you felt that you were on top of things?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

11. In the last week, how often have you been angered because of things that happened that were outside of your control?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

12. In the last week, how often have you found yourself thinking about things that you have to accomplish?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

13. In the last week, how often have you been able to control the way you spend your time?

☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

14. In the last week, how often have you felt difficulties were piling up so high that you could not overcome them?

☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

15. I could easily count from one to twenty-five

True ☐ False ☐

16. I have never talked to anyone by telephone

True ☐ False ☐

17. I make all my own clothes and shoes

True ☐ False ☐

18. Things with sugar in them usually taste sweet to me

True ☐ False ☐

Support Scale

1. There is a special person who is around when I am in need

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

2. There is a special person with whom I can share my joys and sorrows

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

3. My family really tries to help me

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

4. I get the emotional help and support I need from my family

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

5. I have a special person who is a real source of comfort to me

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

6. My friends really try to help me

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

7. I can count on my friends when things go wrong

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

8. I can talk about my problems with my family

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

9. I have friends with whom I can share my joys and sorrows

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

10. There is a special person in my life who cares about my feelings

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

11. My family is willing to help me make decisions

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

12. I can talk about my problems with my friends

1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Very Strongly Disagree — Neutral — Very Strongly Agree

Mood Scale

Instructions: This questionnaire consists of 20 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the **past two weeks, including today.** Check the box beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

☐ I do not feel sad.
☐ I feel sad much of the time.
☐ I am sad all the time.
☐ I am so sad or unhappy that I can't stand it.

2. Pessimism

☐ I am not discouraged about my future.
☐ I feel more discouraged about my future than I used to be.
☐ I do not expect things to work out for me.
☐ I feel my future is hopeless and will only get worse.

3. Past Failure

☐ I do not feel like a failure.
☐ I have failed more than I should have.
☐ As I look back, I see a lot of failures.
☐ I feel I am a total failure as a person.

4. Loss of Pleasure

☐ I get as much pleasure as I ever did from the things I enjoy.
☐ I don't enjoy things as much as I used to.
☐ I get very little pleasure from the things I used to enjoy.
☐ I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- ☐ I don't feel particularly guilty.
- ☐ I feel guilty over many things I have done or should have done.
- ☐ I feel quite guilty most of the time.
- ☐ I feel guilty all the time.

6. Punishment Feelings

- ☐ I don't feel I am being punished.
- ☐ I feel I may be punished.
- ☐ I expect to be punished.
- ☐ I feel I am being punished.

7. Self-Dislike

- ☐ I feel the same about myself as ever.
- ☐ I have lost confidence in myself.
- ☐ I am disappointed in myself.
- ☐ I dislike myself.

8. Self-Criticalness

- ☐ I don't criticize or blame myself more than usual.
- ☐ I am more critical of myself than I used to be.
- ☐ I criticize myself for all of my faults.
- ☐ I blame myself for everything bad that happens.

10. Crying

- ☐ I don't cry anymore than I used to.
- ☐ I cry more than I used to.
- ☐ I cry over every little thing.
- ☐ I feel like crying, but I can't.

11. Agitation

- ☐ I am no more restless or wound up than usual.
- ☐ I feel more restless or wound up than usual.
- ☐ I am so restless or agitated that it's hard to stay still.
- ☐ I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- ☐ I have not lost interest in other people or activities.
- ☐ I am less interested in other people or things than before.
- ☐ I have lost most of my interest in other people or things.
- ☐ It's hard to get interested in anything.

13. Indecisiveness

- ☐ I make decisions about as well as ever.
- ☐ I find it more difficult to make decisions than usual.
- ☐ I have much greater difficulty in making decisions than I used to.
- ☐ I have trouble making any decisions.

14. Worthlessness

- ☐ I do not feel I am worthless.
- ☐ I don't consider myself as worthwhile and useful as I used to.
- ☐ I feel more worthless as compared to other people.
- ☐ I feel utterly worthless.

15. Loss of Energy

- ☐ I have as much energy as ever.
- ☐ I have less energy than I used to have.
- ☐ I don't have enough energy to do very much.
- ☐ I don't' have enough energy to do anything.

16. Changes in Sleeping Pattern

- ☐ I have not experienced any change in my sleeping patterns.
- ☐ I sleep somewhat more than usual.
- ☐ I sleep somewhat less than usual.
- ☐ I sleep a lot more than usual.
- ☐ I sleep a lot less than usual.
- ☐ I sleep most of the day.
- ☐ I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- ☐ I am no more irritable than usual.
- ☐ I am more irritable than usual.
- ☐ I am much more irritable than usual.
- ☐ I am irritable all the time.

18. Changes in Appetite

- ☐ I have not experienced any change in my appetite.
- ☐ My appetite is somewhat less than usual.
- ☐ My appetite is somewhat greater than usual.
- ☐ My appetite is much less than before.
- ☐ My appetite is much greater than usual.
- ☐ I have no appetite at all.
- ☐ I crave food all the time.

19. Concentration Difficulty

- ☐ I can concentrate as well as ever.
- ☐ I can't concentrate as well as usual.
- ☐ It's hard to keep my mind on anything for very long.
- ☐ I find I can't concentrate on anything.

20. Tiredness or Fatigue

- ☐ I am no more tired or fatigued than usual.
- ☐ I get more tired or fatigued more easily than usual.
- ☐ I am too tired or fatigued to do a lot of the things I used to do.
- ☐ I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- ☐ I have not noticed any recent changes in my interest in sex.
- ☐ I am less interested in sex than I used to be.
- ☐ I am much less interest in sex now.
- ☐ I have lost interest in sex completely.

Life stress

1. Are you currently experiencing any stressful events in your life such as:

financial problems	Yes	☐	No	☐
marital problems	Yes	☐	No	☐
death in the family	Yes	☐	No	☐
serious illness in the family	Yes	☐	No	☐
moving	Yes	☐	No	☐
unemployment	Yes	☐	No	☐
job change	Yes	☐	No	☐

2. Is your infant experiencing any health problems? Yes ☐ No ☐

3. Are you having problems with feeding your baby? Yes ☐ No ☐

If yes, please check all that apply:

Problems with milk production ☐

The baby has a gastro-intestinal problem ☐

Other (please specify): _____

4. Are you having problems with your baby sleeping? Yes ☐ No ☐

5. Would you consider your baby irritable or fussy? Yes ☐ No ☐

6. Does your baby cry a lot? Yes ☐ No ☐

7. Is your baby difficult to console or soothe? Yes ☐ No ☐

Sleep Quality

1. How well does your baby sleep?

☐ Very well ☐ ☐ Average ☐ ☐ Very poorly

2. On average, how many times a night do you get woken up by your baby or wake up your baby to feed him or her?

☐ Not at all ☐ Once ☐ Twice ☐ Three times ☐ Four times or more

3. On average, how many hours of sleep do you get a night? _____

4. Please rate how much you agree with the following statement:

My baby's sleep patterns allow me to get a reasonable amount of sleep.

Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

5. On average, I am getting:

1☐ Less sleep than usual 2☐ 3☐ Average 4☐ 5☐ More sleep than usual

6. How often do you feel tired or fatigued?

☐ Never ☐ Sometimes ☐ Occasionally ☐ Often ☐ Very often

Elation Scale

Below is a list of statements. Please rate your agreement with each of the following items in terms of how you have been feeling this past week, including today.

1. I feel like a capable person

☐ Strongly Disagree ☐ Disagree ☐ Slightly Disagree ☐ Neither Agree or Disagree ☐ Slightly Agree ☐ Agree ☐ Strongly Agree

2. I actually feel great about myself

☐ Strongly Disagree ☐ Disagree ☐ Slightly Disagree ☐ Neither Agree or Disagree ☐ Slightly Agree ☐ Agree ☐ Strongly Agree

3. I feel energized, or full of energy

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

4. The world seems like a brighter place

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

5. I have felt elated, high, or unusually cheerful

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

6. I have very warm feelings toward other people

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

7. I smile and laugh a lot

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

8. I feel able to take on anything

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

9. I feel excited or enthusiastic

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

10. I feel like I am on cloud nine

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

11. I feel very happy or full of joy

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

12. I feel very delighted

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

In the past 3 days, have you felt any of the following conditions?

1. Have you felt elated (high or unusually cheerful)?

Yes, a lot ☐ Yes, a little ☐ No ☐

2. Have you felt more active than usual?

Yes, a lot ☐ Yes, a little ☐ No ☐

3. Have you felt more talkative than usual, or a pressure to keep on talking?

Yes, a lot ☐ Yes, a little ☐ No ☐

4. Have your thoughts raced?

Yes, a lot ☐ Yes, a little ☐ No ☐

5. Have you felt that you are a specially important person with special talents or abilities?

Yes, a lot ☐ Yes, a little ☐ No ☐

6. Have you felt the need for less sleep?

Yes, a lot ☐ Yes, a little ☐ No ☐

7. Have you had trouble concentrating because your attention keeps jumping to unimportant things around you?

Yes, a lot ☐ Yes, a little ☐ No ☐

Body Scale

1) Check the box that best describes how you feel about your body right now:

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Extremely Satisfied			Neutral			Extremely Dissatisfied

2) Compared to how happy/satisfied you typically are with your body, how do you feel about your body right now:

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Much more satisfied than usual			The same as usual			Much more dissatisfied than usual

Appendix E

Follow-up Questionnaire

General Information

1) Your month of Birth: _____

2) Your year of Birth: _____

3) Please answer the following questions about your delivery:

Date of Delivery (dd/mm/yyyy):_____

Sex of infant(s):_____

4) Marital status:

Married/common law ☐ Single ☐ Dating ☐

Divorced/separated ☐ Widowed ☐ In a long-term relationship ☐

5) What is your current city/town/or village of residence?_____

6) Are you currently employed?

Yes ☐ No ☐ Retired ☐ Maternity leave ☐

7) What is your overall employment situation?

Full Time ☐ Stay at home parent ☐

Part Time ☐ Disability pension ☐

Student ☐

8) How are you currently feeding your infant? (Check all that apply)

Breastfeeding ☐

Bottle feeding (formula) ☐

Bottle feeding (breast-milk) ☐

9) On average, how many times in a 24-hour period do you feed your baby?

_____

10) How long does it usually take to feed your infant?

_____

11) Please rate the strength of your bond with your infant:

☐	☐	☐	☐	☐
Very weak bond	Weak bond	Average bond	Strong bond	Very strong bond

12) Are you currently on medication for depression?

Yes ☐ No ☐

If yes, please indicate: _____

13) I try to get at least some sleep every night

True ☐ False ☐

14) I have attended school at some time during my life

True ☐ False ☐

15) I have never had any hair on my head

True ☐ False ☐

16) I have never ridden in an automobile

True ☐ False ☐

Mood Scale

As you have recently had a baby, we would like to know how you are feeling. Please mark 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, all the time
☒ Yes most of the time
☐ No, not very often
☐ No, not at all

This would mean: "I've felt happy most of the time" during the past week. Please complete the other questions in the same way.

In the past 7 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 been anxious or worried for no 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 so unhappy that I have had difficulty sleeping
- ☐ Yes, most of the 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

Relationship Scale

(Note: if you are not in a relationship please skip the next 32 items and proceed directly to the stress scale)

Most persons have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list.

	Always agree	Almost always agree	Occa-sionally disagree	Fre-quently disagree	Almost always disagree	Always disagree
1. Handling family finances	☐	☐	☐	☐	☐	☐
2. Matters of recreation	☐	☐	☐	☐	☐	☐
3. Religious matters	☐	☐	☐	☐	☐	☐
4. Demonstrations of affection	☐	☐	☐	☐	☐	☐
5. Friends	☐	☐	☐	☐	☐	☐
6. Sex relations	☐	☐	☐	☐	☐	☐
7. Conventionality (correct or proper behavior)	☐	☐	☐	☐	☐	☐
8. Philosophy of life	☐	☐	☐	☐	☐	☐
9. Ways of dealing with parents or in-laws	☐	☐	☐	☐	☐	☐
10. Aims, goals, and things believed important	☐	☐	☐	☐	☐	☐
11. Amount of time spent together	☐	☐	☐	☐	☐	☐
12. Making major decisions	☐	☐	☐	☐	☐	☐
13. Household tasks	☐	☐	☐	☐	☐	☐
14. Leisure time interests and activities	☐	☐	☐	☐	☐	☐
15. Career decisions	☐	☐	☐	☐	☐	☐

	All the time	Most of the time	More often than not	Occa-sionaly	Rarely	Never
16. How often do you discuss or have you considered divorce, separation, or terminating your relationship?	☐	☐	☐	☐	☐	☐
17. How often do you or your mate leave the house after a fight?	☐	☐	☐	☐	☐	☐
18. In general, how often do you think that things between you and your partner are going well?	☐	☐	☐	☐	☐	☐
19. Do you confide in your mate?	☐	☐	☐	☐	☐	☐
20. Do you ever regret that you married? *(or lived together)*	☐	☐	☐	☐	☐	☐
21. How often do you and your partner quarrel?	☐	☐	☐	☐	☐	☐
22. How often do you and your mate "get on each other's nerves?"	☐	☐	☐	☐	☐	☐

	Every day	Almost Every day	Occa-sionally	Rarely	Never
23. Do you kiss your mate?	☐	☐	☐	☐	☐

	All of them	Most of them	Some of them	Very few of them	None of them
24. Do you and your mate engage in outside interests together?	☐	☐	☐	☐	☐

How often would you say the following events occur between you and your mate?

	Never	Less than once a month	Once or twice a month	Once or twice a week	Once a day	More often
25. Have a stimulating exchange of ideas	☐	☐	☐	☐	☐	☐
26. Laugh together	☐	☐	☐	☐	☐	☐
27. Calmly discuss something	☐	☐	☐	☐	☐	☐

	Never	Less than once a month	Once or twice a month	Once or twice a week	Once a day	More often
28. Work together on a project	☐	☐	☐	☐	☐	☐

There are some things about which couples sometimes agree and sometime disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks (Check yes or no)

	Yes	No
29. Being too tired for sex	☐	☐
30. Not showing love	☐	☐

31. The dots on the following line represent different degrees of happiness in your relationship. The middle point, "happy", represents the degree of happiness of most relationships. Please circle the dot which best describes the degree of happiness, all things considered, of your relationship.

☐ ☐ ☐ ☐ ☐ ☐ ☐

Extremely Unhappy | Fairly Unhappy | A little Unhappy | Happy | Very Happy | Extremely Happy | Perfect

32. Which of the following statements best describes how you feel about the future of your relationship? (Please choose only 1)

☐ I want desperately for my relationship to succeed, and would go to almost any length to see that it does.

☐ I want very much for my relationship to succeed, and I'll do all I can to see that it does.

☐ I want very much for my relationship to succeed and I will do my fair share to see that it does.

☐ It would be nice if my relationship succeeded, but I can't do much more than I am doing now to help it succeed.

☐ It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going

☐ My relationship can never succeed, and there is no more that I can do to keep the relationship going.

Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate *how* often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

For each question choose from the following alternatives:
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

1. In the last month, how often have you been upset because of something that happened unexpectedly?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

2. In the last month, how often have you felt that you were unable to control the important things in your life?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

3. In the last month, how often have you felt nervous and "stressed"?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

4. In the last month, how often have you dealt successfully with irritating life hassles?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

6. In the last month, how often have you felt confident about your ability to handle your personal problems?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

7. In the last month, how often have you felt that things were going your way?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

8. In the last month, how often have you found that you could not cope with all the things that you had to do?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

9. In the last month, how often have you been able to control irritations in your life?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

10. In the last month, how often have you felt that you were on top of things?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

11. In the last month, how often have you been angered because of things that happened that were outside of your control?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

12. In the last month, how often have you found yourself thinking about things that you have to accomplish?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

13. In the last month, how often have you been able to control the way you spend your time?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
☐ never
☐ almost never
☐ sometimes
☐ fairly often
☐ very often

15. I could easily count from one to twenty-five

True ☐ False ☐

16. I have never talked to anyone by telephone

True ☐ False ☐

17. I make all my own clothes and shoes

True ☐ False ☐

18. Things with sugar in them usually taste sweet to me

True ☐ False ☐

Support Scale

1. There is a special person who is around when I am in need

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

2. There is a special person with whom I can share my joys and sorrows

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

3. My family really tries to help me

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

4. I get the emotional help and support I need from my family

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

5. I have a special person who is a real source of comfort to me

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

6. My friends really try to help me

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

7. I can count on my friends when things go wrong

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

8. I can talk about my problems with my family

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

9. I have friends with whom I can share my joys and sorrows

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

10. There is a special person in my life who cares about my feelings

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

11. My family is willing to help me make decisions

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

12. I can talk about my problems with my friends

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Very Strongly Disagree			Neutral			Very Strongly Agree

Mood Scale

Instructions: This questionnaire consists of 20 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the **past two weeks, including today.** Check the box beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

- ☐ I do not feel sad.
- ☐ I feel sad much of the time.
- ☐ I am sad all the time.
- ☐ I am so sad or unhappy that I can't stand it.

2. Pessimism

- ☐ I am not discouraged about my future.
- ☐ I feel more discouraged about my future than I used to be.
- ☐ I do not expect things to work out for me.
- ☐ I feel my future is hopeless and will only get worse.

3. Past Failure

- ☐ I do not feel like a failure.
- ☐ I have failed more than I should have.
- ☐ As I look back, I see a lot of failures.
- ☐ I feel I am a total failure as a person.

4. Loss of Pleasure

- ☐ I get as much pleasure as I ever did from the things I enjoy.
- ☐ I don't enjoy things as much as I used to.
- ☐ I get very little pleasure from the things I used to enjoy.
- ☐ I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- ☐ I don't feel particularly guilty.
- ☐ I feel guilty over many things I have done or should have done.
- ☐ I feel quite guilty most of the time.
- ☐ I feel guilty all the time.

6. Punishment Feelings

- ☐ I don't feel I am being punished.
- ☐ I feel I may be punished.
- ☐ I expect to be punished.
- ☐ I feel I am being punished.

7. Self-Dislike

- ☐ I feel the same about myself as ever.
- ☐ I have lost confidence in myself.
- ☐ I am disappointed in myself.
- ☐ I dislike myself.

8. Self-Criticalness

- ☐ I don't criticize or blame myself more than usual.
- ☐ I am more critical of myself than I used to be.
- ☐ I criticize myself for all of my faults.
- ☐ I blame myself for everything bad that happens.

10. Crying

- ☐ I don't cry anymore than I used to.
- ☐ I cry more than I used to.
- ☐ I cry over every little thing.
- ☐ I feel like crying, but I can't.

11. Agitation

- ☐ I am no more restless or wound up than usual.
- ☐ I feel more restless or wound up than usual.
- ☐ I am so restless or agitated that it's hard to stay still.
- ☐ I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- ☐ I have not lost interest in other people or activities.
- ☐ I am less interested in other people or things than before.
- ☐ I have lost most of my interest in other people or things.
- ☐ It's hard to get interested in anything.

13. Indecisiveness

- ☐ I make decisions about as well as ever.
- ☐ I find it more difficult to make decisions than usual.
- ☐ I have much greater difficulty in making decisions than I used to.
- ☐ I have trouble making any decisions.

14. Worthlessness

- ☐ I do not feel I am worthless.
- ☐ I don't consider myself as worthwhile and useful as I used to.
- ☐ I feel more worthless as compared to other people.
- ☐ I feel utterly worthless.

15. Loss of Energy

- ☐ I have as much energy as ever.
- ☐ I have less energy than I used to have.
- ☐ I don't have enough energy to do very much.
- ☐ I don't' have enough energy to do anything.

16. Changes in Sleeping Pattern

- ☐ I have not experienced any change in my sleeping patterns.

- ☐ I sleep somewhat more than usual.
- ☐ I sleep somewhat less than usual.

- ☐ I sleep a lot more than usual.
- ☐ I sleep a lot less than usual.

- ☐ I sleep most of the day.
- ☐ I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- ☐ I am no more irritable than usual.
- ☐ I am more irritable than usual.
- ☐ I am much more irritable than usual.
- ☐ I am irritable all the time.

18. Changes in Appetite

- ☐ I have not experienced any change in my appetite.
- ☐ My appetite is somewhat less than usual.
- ☐ My appetite is somewhat greater than usual.
- ☐ My appetite is much less than before.
- ☐ My appetite is much greater than usual.
- ☐ I have no appetite at all.
- ☐ I crave food all the time.

19. Concentration Difficulty

- ☐ I can concentrate as well as ever.
- ☐ I can't concentrate as well as usual.
- ☐ It's hard to keep my mind on anything for very long.
- ☐ I find I can't concentrate on anything.

20. Tiredness or Fatigue

- ☐ I am no more tired or fatigued than usual.
- ☐ I get more tired or fatigued more easily than usual.
- ☐ I am too tired or fatigued to do a lot of the things I used to do.
- ☐ I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- ☐ I have not noticed any recent changes in my interest in sex.
- ☐ I am less interested in sex than I used to be.
- ☐ I am much less interest in sex now.
- ☐ I have lost interest in sex completely.

Life stress

1. Are you currently experiencing any stressful events in your life such as:

financial problems	Yes	☐	No	☐
marital problems	Yes	☐	No	☐
death in the family	Yes	☐	No	☐
serious illness in the family	Yes	☐	No	☐
moving	Yes	☐	No	☐
unemployment	Yes	☐	No	☐
job change	Yes	☐	No	☐

2. Is your infant experiencing any health problems? Yes ☐ No ☐

3. Are you having problems with feeding your baby? Yes ☐ No ☐

If yes, please check all that apply:

Problems with milk production ☐

The baby has a gastro-intestinal problem ☐

Other (please specify): _____

4. Are you having problems with your baby sleeping? Yes ☐ No ☐

5. Would you consider your baby irritable or fussy? Yes ☐ No ☐

6. Does your baby cry a lot? Yes ☐ No ☐

7. Is your baby difficult to console or soothe? Yes ☐ No ☐

Sleep Quality

1. How well does your baby sleep?

☐ ☐ ☐ ☐ ☐

Very well Average Very poorly

2. On average, how many times do you get woken up during the night by your baby?

☐ ☐ ☐ ☐ ☐

Not at all Once Twice Three times 4 times or more

3. On average, how many hours of sleep do you get a night? _____

4. Please rate how much you agree with the following statement:
My baby's sleep patterns allow me to get a reasonable amount of sleep.

Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

5. On average, I am getting:

1☐ 2☐ 3☐ 4☐ 5☐

Less sleep than usual Average More sleep than usual

Elation Scale

Below is a list of statements. Please rate your agreement with each of the following items in terms of how you have been feeling this past week, including today.

1. I feel like a capable person

☐ ☐ ☐ ☐ ☐ ☐ ☐

Strongly Disagree Disagree Slightly Disagree Neither Agree or Disagree Slightly Agree Agree Strongly Agree

2. I actually feel great about myself

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

3. I feel energized, or full of energy

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

4. The world seems like a brighter place

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

5. I have felt elated, high, or unusually cheerful

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

6. I have very warm feelings toward other people

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

7. I smile and laugh a lot

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

8. I feel able to take on anything

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

9. I feel excited or enthusiastic

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

10. I feel like I am on cloud nine

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

11. I feel very happy or full of joy

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

12. I feel very delighted

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree

In the past 3 days, have you felt any of the following conditions?

1. Have you felt elated (high or unusually cheerful)?

Yes, a lot ☐ Yes, a little ☐ No ☐

2. Have you felt more active than usual?

Yes, a lot ☐ Yes, a little ☐ No ☐

3. Have you felt more talkative than usual, or a pressure to keep on talking?

Yes, a lot ☐ Yes, a little ☐ No ☐

4. Have your thoughts raced?

Yes, a lot ☐ Yes, a little ☐ No ☐

5. Have you felt that you are a specially important person with special talents or abilities?

Yes, a lot ☐ Yes, a little ☐ No ☐

6. Have you felt the need for less sleep?

Yes, a lot ☐ Yes, a little ☐ No ☐

7. Have you had trouble concentrating because your attention keeps jumping to unimportant things around you?

Yes, a lot ☐ Yes, a little ☐ No ☐

Body Scale

1) Check the box that best describes how you feel about your body right now:

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Extremely Satisfied			Neutral			Extremely Dissatisfied

2) Compared to how happy/satisfied you typically are with your body, how do you feel about your body right now:

1☐	2☐	3☐	4☐	5☐	6☐	7☐
Much more satisfied than usual			The same as usual			Much more dissatisfied than usual

Appendix F

Motherhood and Mood Debriefing Form

The goal of the study is to show how social stressors, such as lack of social support, affect mood shortly after the birth of your baby. Research in the past has shown that the rates of depression are the same for boys and girls up until puberty. After that, girls become twice as likely to develop depression compared to boys (Steiner, Dunn, & Born, 2003). It is believed that the higher rates for depression in women may be linked to the menstrual cycle. Another reason could be hormones, such as estrogen. Also, such things as stress, social support, and lack of sleep may affect your mood after the birth of your baby.

If you have become in any way distressed from completing this study, or if you would like to discuss any personal issues, you can contact the following services:

- Your Family Physician
- The 24 Hour Thunder Bay Crisis Response Service at (807) 346-8282
- The Postpartum Depression and Anxiety Support Group at (807) 625-5972
- The Thunder Bay Regional Health Sciences Centre Walk in Clinic at (807) 768-1333

Your replies are coded so that your identity will be kept confidential. If you would like a copy of the results of this study, please give your name and address or email address to the researchers and we will send you a summary of the study when it is completed.

We have listed several articles which you may like to read to learn more about things which may affect your well-being after your baby is born.

Thank you for taking part in this study.

Recommended Readings:

Douma, S. L., Husband, C., O'Donnell, M. E., Barwin, B. N., & Woodend, A. K. (2005). Estrogen-related mood disorders: Reproductive life cycle factors. *Advances in Nursing Science, 28*, 364-375.

Nielsen Forman, D., Videbech, P., Hedegaard, M., Dalby Salvig, J., & Secher, N. J. (2000). Postpartum depression: Identification of women at risk. *British Journal of Obstetrics and Gynaecology, 107*, 1210-1217.

Sharma, V., & Mazmanian, D. (2003). Sleep loss and postpartum psychosis. *Bipolar Disorders, 5*, 98-105.

Steiner, M., Dunn, E., & Born, L. (2003). Hormones and mood: From menarche to menopause and beyond. *Journal of Affective Disorders, 74*, 67-83.

- You may contact the researchers at any time by emailing mothers@lakeheadu.ca. If you have any questions or concerns regarding this study please contact Emily Russell (erussell@lakeheadu.ca) or the supervisor of this study, Dr. Dwight Mazmanian (phone: (807) 343-8257, email: dwight.mazmanian@lakeheadu.ca).
- Other colleagues in this study include Dr. Kirsten Oinonen (Associate Professor of Psychology at Lakehead University).
- If you have any questions about your rights as a research subject, please contact the Lakehead University Research Ethics Board at (807) 343-8283, or the Thunder Bay Regional Health Sciences Centre Research Ethics Office at (807) 684-6422.

Appendix G

Means, Standard Deviations, and *t*-Values for All Non-Significant Binary Variables

Week 1 Depression Variables		*M*	*SD*	*t*	*df*
Past episode of depression	No	-0.16	0.71	-1.23	30
	Yes	0.26	1.21		
Family history of mental illness	No	-0.01	0.73	-0.06	30
	Yes	0.01	1.07		
Miscarriage	No	-0.08	0.81	-0.91	30
	Yes	0.28	1.32		
Pregnancy complications	No	-0.18	0.80	-1.09	29
	Yes	0.19	1.01		
Planned pregnancy	No	-0.36	0.67	-1.49	30
	Yes	0.16	1.00		
Financial problems	No	0.12	0.89	0.78	30
	Yes	-0.14	0.99		
Unemployment	No	0.03	0.83	0.38	30
	Yes	-0.12	1.30		
Job change	No	0.08	0.96	1.31	30
	Yes	-0.56	0.55		
Infant health problems	No	-0.02	1.00	-0.34	30
	Yes	0.13	0.44		
Baby difficult to soothe	No	-0.05	0.97	-0.86	30
	Yes	0.38	0.59		

Week 1 Elation Variables		*M*	*SD*	*t*	*df*
Past episode of depression	No	62.30	13.22	1.37	29
	Yes	55.91	10.87		

Family history of mental illness	No	61.61	13.57	0.59	29
	Yes	58.88	12.18		
Abortion	No	61.17	12.84	0.92	29
	Yes	56.14	12.01		
Miscarriage	No	59.12	12.61	-0.82	29
	Yes	63.83	13.18		
Pregnancy complications	No	64.33	10.78	1.53	28
	Yes	57.17	13.60		
Planned pregnancy	No	63.40	12.60	1.03	29
	Yes	58.43	12.64		
History of negative mood change in the postpartum period	No	64.83	6.85	1.77	11
	Yes	55.14	11.81		
Financial problems	No	56.71	14.40	-1.73	27.27
	Yes	64.07	9.03		
Unemployment	No	58.88	13.47	-0.94	29
	Yes	64.00	8.93		
Infant health problems	No	60.40	12.13	0.33	29
	Yes	58.50	15.76		
Problems feeding baby	No	60.27	12.40	0.16	29
	Yes	59.44	13.95		
Baby difficult to soothe	No	61.67	12.16	1.19	28
	Yes	53.00	9.85		

Week 1 Composite Mood Variables		*M*	*SD*	*t*	*df*
Past episode of depression	No	-0.49	1.35	-1.70	28
	Yes	0.55	2.01		
Family history of mental illness	No	-0.37	1.36	-0.69	28
	Yes	0.06	1.86		
Abortion	No	-0.43	1.37	-1.53	7.4
	Yes	0.93	2.22		

Miscarriage	No	-0.12	1.53	-0.05	28
	Yes	-0.08	2.35		
Pregnancy complications	No	-0.60	1.34	-1.40	27
	Yes	0.28	1.85		
Planned pregnancy	No	-0.62	1.29	-1.19	28
	Yes	0.14	1.81		
Financial problems	No	0.25	1.80	1.30	28
	Yes	-0.53	1.46		
Unemployment	No	-0.01	1.63	0.58	28
	Yes	-0.44	1.87		
Infant health problems	No	-0.12	1.77	-0.04	28
	Yes	-0.09	1.17		
Problems feeding baby	No	-0.38	1.42	-1.34	28
	Yes	0.50	2.10		
Baby difficult to soothe	No	-0.21	1.69	-0.96	28
	Yes	0.77	1.38		

Week 5 Depression Variables		*M*	*SD*	*t*	*df*
Past episode of depression	No	-0.13	0.87	-0.63	15
	Yes	0.16	1.05		
Family history of mental illness	No	0.19	0.76	0.73	15
	Yes	-0.15	1.05		
Miscarriage	No	-0.03	0.98	-0.16	15
	Yes	0.07	0.82		
Pregnancy complications	No	0.11	0.85	0.22	14
	Yes	-0.01	1.03		
Planned pregnancy	No	-0.45	0.62	-0.90	15
	Yes	0.09	0.98		
History of negative mood change in the postpartum period	No	-0.09	1.13	-1.11	7
	Yes	0.67	0.90		

Financial problems	No	0.03	1.04	0.20	15
	Yes	-0.06	0.86		
Problems feeding baby	No	-0.16	0.78	-0.88	15
	Yes	0.26	1.19		
Irritable baby	No	0.02	1.02	0.25	15
	Yes	-0.13	0.41		

Week 5 Elation Variables		*M*	*SD*	*t*	*df*
Past episode of depression	No	60.88	14.62	1.48	13
	Yes	50.17	12.30		
Family history of mental illness	No	54.83	11.20	-0.38	13
	Yes	57.78	16.66		
Miscarriage	No	54.46	14.12	-1.54	13
	Yes	70.50	6.36		
Pregnancy complications	No	59.75	12.95	0.55	12
	Yes	54.80	15.90		
Planned pregnancy	No	54.00	11.53	-0.34	13
	Yes	57.25	15.34		
History of negative mood change in the postpartum period	No	54.33	18.58	0.21	5
	Yes	51.50	16.66		
Financial problems	No	59.00	18.27	0.68	13
	Yes	53.86	8.61		
Problems feeding baby	No	55.90	11.48	-0.26	13
	Yes	58.00	20.48		
Irritable baby	No	55.83	15.54	-0.40	13
	Yes	59.67	9.71		

Week 5 Composite Mood Variables		*M*	*SD*	*t*	*df*
Past episode of depression	No	-0.55	1.74	-1.19	13
	Yes	0.60	1.97		

Family history of mental illness	No	0.22	1.22	0.52	13
	Yes	-0.30	2.23		
Miscarriage	No	0.05	1.91	0.72	13
	Yes	-0.99	1.61		
Pregnancy complications	No	-0.16	1.51	-0.16	12
	Yes	0.03	2.12		
Planned pregnancy	No	-0.30	1.44	-0.21	13
	Yes	-0.04	2.00		
History of negative mood change in the postpartum period	No	0.04	2.29	-0.66	5
	Yes	1.16	2.16		
Financial problems	No	-0.18	2.26	-0.20	13
	Yes	0.01	1.43		
Problems feeding baby	No	-0.17	1.47	-0.23	13
	Yes	0.07	2.67		
Irritable baby	No	-0.02	2.06	0.30	13
	Yes	-0.39	0.85		