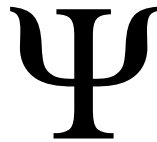**DET PSYKOLOGISKE FAKULTET**

Ψ

Prenatal Psychosocial Risk Factors for the Development of
Postpartum Depression

HOVEDOPPGAVE

profesjonsstudiet i psykologi

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Running Head: RISK FACTORS FOR POSTPARTUM DEPRESSION

Abstract

In this study, multiple regression analysis was used to investigate the importance of prenatal psychosocial risk factors for the development of symptoms of postpartum depression in a community sample. The sample ($N = 46$) consisted of Norwegian women between 19 and 41 years of age ($M = 29.11$, $SD = 4.84$). Predictors were measured during the 28th week of pregnancy and depression symptoms assessed 3 months postpartum with the Depression subscale of the Hospital Anxiety and Depression Scale (HADS-D) and the Edinburgh Postnatal Depression Scale (EPDS). Symptoms of prenatal anxiety and depression together predicted postpartum EPDS score ($R^2 = .221$, $p = .019$). Emotional support tempered the adverse effect of prenatal anxiety on postpartum HADS-D score, whereas instrumental support potentiated this effect. Higher partner's income predicted lower postpartum HADS-D score. The best model for postpartum HADS-D included the predictors prenatal anxiety, emotional support, partner's income, and the interaction between prenatal anxiety and emotional support ($R^2 = .470$, $p < .001$). Results are discussed and interpreted in light of previous research and relevant psychological theory. The importance of research on risk factors for postpartum depression is stressed in relation to the need for early detection and speedy implementation of treatment.

Sammendrag

I denne studien ble multippel regresjonsanalyse benyttet for å undersøke betydningen av

prenatale psykososiale risikofaktorer for utvikling av symptomer på postpartum depresjon i et

ikke-klinisk utvalg. Utvalget (*N* = 46) bestod av norske kvinner i alderen 19 til 41 år (*M* =

29.11, *SD* = 4.84). Prediktorvariabler ble målt i 28. svangerskapsuke og

depresjonssymptomer ble målt 3 måneder etter fødsel ved bruk av depresjonssubskalaen av

Hospital Anxiety and Depression Scale (HADS-D) og Edinburgh Postnatal Depression Scale

(EPDS). Prenatale angst- og depresjonssymptomer predikerte sammen postpartum EPDS-

skåre (*R²* = .221, *p* = .019). Emosjonell støtte modererte den negative effekten av prenatal

angst på postpartum HADS-D-skåre, mens instrumentell støtte forsterket den samme effekten.

Høyere inntekt hos partner predikerte lavere postpartum HADS-D-skåre. Den beste modellen

for postpartum HADS-D bestod av prediktorene prenatal angst, emosjonell støtte, partners

inntekt og interaksjonen mellom prenatal angst og emosjonell støtte (*R²* = .470, *p* < .001).

Resultatene drøftes og tolkes i lys av tidligere forskning og relevant psykologisk teori.

Betydningen av forskning på risikofaktorer for postpartum depresjon understrekes med

henblikk på behovet for tidlig diagnostisering og implementering av behandling.

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Prenatal Psychosocial Risk Factors for the Development of Postpartum Depression

This study is an investigation of the importance of psychosocial risk factors in pregnancy for the development of symptoms of postpartum depression in a community sample. Women in a municipality near Bergen, Norway, were asked to complete questionnaires about psychosocial factors and mental health status in their third trimester and again three months postpartum. Results of some studies indicate that the first three months after childbirth constitute a period of increased risk for depression in women (Munk-Olsen, Laursen, Pedersen, Mors, & Mortensen, 2006; Vesga-López et al., 2008). Postpartum depression has serious consequences for the woman herself, her infant, and her family (Goodman, 2004). Early detection and the speedy implementation of treatment hinges on knowledge of which factors can predict the development of postpartum depression. Clearly, this is a topic worthy of research. The current study aims to contribute to the understanding of the risk factors for postpartum depression.

Depression and the Postpartum Period

Postpartum depression may be defined as "any non-psychotic depressive illness occurring during the first postnatal year" (Scottish Intercollegiate Guidelines Network, 2012, p. 3). However, this definition is not universally accepted. There is a lack of general agreement as to whether postpartum depression should be regarded as a clinical entity in its own right, distinct from major depressive disorder and from nonpostpartum forms of minor depression (Halbreich, 2005). Indeed, neither the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 2000) nor the *International Statistical Classification of Diseases and Related Health Problems, 10*[th] *Revision* (ICD-10; World Health Organization, 2010) lists postpartum depression as a specific diagnosis. The DSM-IV (American Psychiatric Association, 2000) does, however, allow the application of the specifier "with postpartum onset" to the current or most recent major

depressive, manic, or mixed episode if onset is within four weeks after childbirth. Similarly, there is a category in the ICD-10 for mental disorders associated with the puerperium— defined as commencing within six weeks of delivery—that do not meet the criteria for disorders classified elsewhere in the chapter on mental and behavioral disorders (World Health Organization, 2010). Some researchers argue that the onset of postpartum depression may occur later in the first postpartum year (Gavin et al., 2005; O'Hara, 2009). Others include depressive episodes that arise during pregnancy and extend into the first postpartum year in their definition of postpartum depression (Escribà-Agüir & Artazcoz, 2011; Gibson, McKenzie-McHarg, Shakespeare, Price, & Gray, 2009).

According to the DSM-IV, symptoms of postpartum depression do not differ from symptoms of nonpostpartum depressive episodes (American Psychiatric Association, 2000). Typically, symptoms include mood lability, tearfulness, feelings of guilt, suicidal ideation, loss of appetite, sleep disturbances, irritability, fatigue, and feelings of inadequacy (Robinson & Stewart, as cited in Robertson, Grace, Wallington, & Stewart, 2004). Postpartum depression is generally relatively mild (Whiffen & Gotlib, 1993), and episodes typically remit spontaneously within six months (O'Hara, 1997). It has been suggested that duration is related to severity (Stowe & Nemeroff, 1995).

Prevalence and Incidence of Postpartum Depression

Estimates of the prevalence and incidence of depressive illnesses and symptoms vary with chosen diagnostic criteria, instruments, methods, and sample characteristics, as well as according to when and over what length of time measurements are performed. O'Hara and Swain (1996) performed a meta-analysis of 59 studies and concluded that the prevalence of postpartum depression is 13 %. Based on a systematic literature review of all English-language research on prevalence and incidence of perinatal depression, Gavin et al. (2005) concluded that best estimates indicate a probable period prevalence of 19.2 % for the first

three postpartum months, with an incidence of 14.5 % for the same time period. In two

Norwegian studies, prevalence of depression was found to be 8.9 % at six weeks postpartum

(Eberhard-Gran, Eskild, Tambs, Samuelsen, & Opjordsmoen, 2002) and 10.0 % at six to 12

weeks postpartum (Berle, Aarre, Mykletun, Dahl, & Holsten, 2003).

Importance of the Problem: Consequences of Postpartum Depression

The importance of postpartum depression as a topic for research is clear when

considering the serious consequences this illness has both for the woman herself and for her

immediate family (Goodman, 2004). Depression is among the most debilitating illnesses for

women during their childbearing years (O'Hara, 2009). Women suffering from postpartum

depression typically exhibit a reduced level of personal and social functioning (Posmontier,

2008), and they may experience a loss of independent identity as well as loneliness and

disappointment when expectations related to the infant or to family life are not met (Edhborg,

Friberg, Lundh, & Widström, 2005). Furthermore, research shows that a history of

postpartum depression symptoms increases the risk of developing physical illnesses,

subsequent depressive episodes, as well as other psychiatric illnesses later in life (Josefsson &

Sydsjö, 2007).

Partners of women suffering from postpartum depression experience fear, confusion,

concern for their spouse, helplessness, frustration, and anger (Davey, Dziurawiec, & O'Brien-

Malone, 2006). Due to her depression, the woman may withdraw from her partner and limit

emotional and physical intimacy, thus straining their relationship (Iles et al., 2011). Further,

evidence suggests that relationship dissatisfaction may persist or even increase through the

first postpartum year, even after the woman's level of depression decreases (Milgrom &

McCloud, 1996). Finally, postpartum depression in one partner correlates with postpartum

depression in the other partner (Iles, Slade, & Spiby, 2011; Pinheiro et al., 2006), so men's

risk of developing depression is elevated when their partner is suffering from postpartum depression (Goodman, 2004).

Postpartum depression reduces the quality of mother–child interaction (Lemola, Stadlmayr, & Grob, 2009; Pauli-Pott, Mertesacker, & Beckmann, 2004) and increases the risk of insecure attachment (Moehler, Brunner, Wiebel, Reck, & Resch, 2006; Righetti-Veltema, Bousquet, & Manzano, 2003). It has a pervasive, deleterious effect on child development, and is associated with more difficult child temperament (McGrath, Records, & Rice, 2008; McMahon, Barnett, Kowalenko, Tennant, & Don, 2001) as well as disturbed cognitive development (Barker, Jaffee, Uher, & Maughan, 2011; Hay et al., 2001) and lower social competence (Luoma et al., 2001). Finally, postpartum depression has been linked to an increased risk of various psychiatric illnesses in offspring (Barker et al., 2011; Murray et al., 2011).

Psychosocial Risk Factors for Postpartum Depression

Depression and anxiety. Results from O'Hara and Swain's (1996) meta-analysis indicate that a history of psychiatric illness is one of the most important risk factors for postpartum depression. More recent studies confirm that a history of depression prior to pregnancy (Marques et al., 2011; Milgrom et al., 2008; Verkerk, Pop, van Son, & van Heck, 2003) as well as both depression and anxiety during pregnancy (Banti et al., 2011; Sutter-Dallay, Giaconne-Marcesche, Glatigny-Dallay, & Verdoux, 2004; Zelkowitz et al., 2008) are important predictors of postpartum depression. For instance, in their literature review, Robertson et al. (2004) reported that studies consistently found that experiencing depressed mood or anxiety during pregnancy was a significant predictor of postpartum depression. Whereas Leigh and Milgrom (2008) found that prenatal depression mediated the effect of prenatal anxiety and formed the strongest predictor of postpartum depression, Heron et al. (2004) found that prenatal anxiety significantly predicted postpartum depression, even after

controlling for prenatal depression. It is uncertain, then, whether prenatal depression or prenatal anxiety is the more important risk factor, but it is clear that both forms of psychopathology during pregnancy can predict postpartum depression. This does not, however, mean that all women who develop postpartum depression would necessarily be prospectively identified by implementing prenatal screening for psychopathology. Edwards, Galletly, Semmler-Booth, and Dekker (2008) found that about half of women who were classified as depressed during pregnancy did not remain depressed after delivery, and, conversely, one third of women diagnosed with postpartum depression were new cases. Thus, the use of prenatal screening may lead to the identification of a substantial number of false positive cases as well as failure to detect a sizable proportion of true cases. As Edwards et al. (2008) note, prenatal screening for the presence of psychopathology and other risk factors may be useful in identifying women who might benefit from prenatal interventions, but this is no substitute for postpartum screening.

        Social support. Social isolation and a lack of social support have been found to be associated with an increased risk of developing postpartum depression (Castle, Slade, Barranco-Wadlow, & Rogers, 2008; Hopkins & Campbell, 2008; Rubertsson, Waldenström, Wickberg, Rådestad, & Hildingsson, 2005). Indeed, in their comprehensive literature review, Robertson et al. (2004) concluded that social support is among the most important risk factors for postpartum depression. However, there does not seem to have been conducted much research concerning exactly how social support influences postpartum depression. Different explanatory models have been proposed for how social support influences mental health generally, and it is conceivable that these models might be valid also for the effects of social support on postpartum mental health.

        One possibility is that social support has a generalized beneficial influence on mental health, perhaps due to the positive experiences, recognition of self-worth, and sense of

predictability and stability that results from being embedded in a social network (Cohen & Wills, 1985). According to such main effect models, social support exerts a direct, positive effect, so that the more social support individuals receive, the less psychological distress they will experience, regardless of the level of stress they are exposed to (Wilcox, 1981). For instance, Mathiesen, Tambs, and Dalgard (1999) investigated risk and protective factors for anxiety and depression among mothers of toddlers. The authors found a direct protective effect of social support from friends and family on symptom levels, with no interaction effects between negative life events and social support. These results fit with a main effect model of how social support influences mental health.

Alternatively, social support may interact with stressors to influence mental health. Proponents of the buffering hypothesis argue that social support protects individuals from potentially adverse effects of stressful events, perhaps by helping them to redefine the potential for harm, or by increasing their belief in their ability to cope with the situation (Cohen & Wills, 1985). According to buffering models, social support will not have any bearing on level of psychological distress in the absence of stressors, but will strongly influence symptom levels under conditions of duress (Wilcox, 1981). For instance, Yang et al. (2010) investigated the relationship between stressful life events, social support from peers, and depressive symptoms among Chinese adolescents. There was no significant main effect of social support on symptom level, but the authors found a significant interaction effect indicating that social support acted as a buffer against depressive symptoms following the experience of a negative life event.

The two explanatory models described above are not mutually exclusive, and some researchers report mixed results. For example, Pierce, Strauman, and Vandell (1999) found both main effects and interaction effects between self-discrepancy, stress, and social support in their study of dejection in mothers of infants, and Swendsen and Mazure (2000) argued that

social support may act both as a main effect by reducing depressive symptoms and as a buffer against the negative consequences of stress. There seems to be a need for clarification as to whether and under what conditions social support acts directly or in interaction with stress to influence depression. Further, studies investigating the mechanisms of how social support influences mental health have been conducted with samples from extremely diverse populations, and it is uncertain how results from these studies may be related to populations of pregnant or postpartum women. Thus, although there is evidence that a lack of social support is an important risk factor for postpartum depression, there is a need to investigate how social support exerts its influence on women's mental health in this period.

Adverse life events. An abundance of research shows that experiencing adverse life events increases the risk of developing postpartum depression (Eberhard-Gran et al., 2002; O'Hara & Swain, 1996; Righetti-Veltema, Conne-Perréard, Bousquet, & Manzano, 1998; Robertson et al., 2004). There are indications that women may be particularly vulnerable to the harmful effects of adverse life events on mental health (Honkalampi et al., 2005; Maciejewski, Prigerson, & Mazure, 2001). Furthermore, pregnancy and the puerperal period may constitute especially vulnerable periods because, during this time, women may be exposed to certain stressful life events that are specific to motherhood in addition to general stressors that may occur at any time during a woman's life (Swendsen & Mazure, 2000).

Demographic factors. Results from a range of studies indicate that, as long as the woman is an adult (i.e., 18 years or older), age is not significantly associated with postpartum depression (Abbott & Williams, 2006; Eastwood, Phung, & Barnett, 2011; O'Hara & Swain, 1996; Robertson et al., 2004). The literature is less clear-cut regarding the association between parity and postpartum depression. Results from some studies indicate that parity is not related to postpartum depression (Bloch, Rotenberg, Koren, & Klein, 2006; Robertson et al., 2004), whereas others suggest that being primiparous is a significant risk factor for the

development of postpartum depression (Abbott & Williams, 2006; Eberhard-Gran et al., 2002), and yet other studies indicate that being multiparous increases the risk of developing depressive symptoms in the postpartum period (Banti et al., 2011; Figueiredo & Conde, 2011). Similarly, research has yielded mixed results regarding the association between relationship status and postpartum depression, with some studies indicating no relation between the two (Banti et al., 2011; Bloch et al., 2006), and results from other studies suggesting that postpartum depression is significantly correlated with living alone or living together with someone other than one's partner (Andersson, Sundström-Poromaa, Wulff, Åström, & Bixo, 2006; Brugha et al., 1998).

Relationship satisfaction. Dissatisfaction with the romantic or marital relationship has been shown to be associated with an increased risk of developing postpartum depression (Eberhard-Gran et al., 2002; Edhborg, Nasreen, & Kabir, 2011; O'Hara & Swain, 1996; Robertson et al., 2004). In fact, in Abbot and Williams' (2006) study, women's dissatisfaction with their partner relationship was found to be the most important risk factor for postpartum depression. Additionally, research suggests that a high level of interpersonal conflict within the marital relationship is linked to postpartum depression (Stowe & Nemeroff, 1995).

Socioeconomic factors. There is a well-established link between socioeconomic difficulties and depression in the general population (Honkalampi et al., 2005; Wang, Schmitz, & Dewa, 2010). Whereas some studies fail to find an association between economic status and postpartum depression (Bloch et al., 2006; Miyake, Tanaka, Sasaki, & Hirota, 2011), others indicate that low socioeconomic status (Edhborg et al., 2011), financial strain (Robertson et al., 2004), and low income (Abbott & Williams, 2006) constitute significant predictors for postpartum depression.

Hypotheses

On the basis of evidence that some of the most important risk factors for postpartum depression include depression and anxiety during pregnancy and limited social support (O'Hara & Swain, 1996; Robertson et al., 2004), we posited the following hypotheses:

H1: Symptoms of depression and anxiety assessed in pregnancy will significantly predict elevated symptom levels of depression three months postpartum.

H2: Lower levels of social support measured in pregnancy will significantly predict elevated symptom levels of depression three months postpartum.

Regarding hypothesis H2, it was not clear from the relevant literature whether social support acts directly to beneficially influence mental health or whether it functions as a buffer for the adverse effects of stressors on mental health. Therefore, we opted to explore both possibilities, examining whether social support influenced postpartum directly, in line with a main effect model, as well as testing whether social support had a protective function only for those women reporting more adverse life events or exhibiting higher prenatal symptom levels of anxiety or depression, in line with a buffering model.

As has been shown, research indicates that a range of other psychosocial factors are also associated with postpartum depression (O'Hara & Swain, 1996; Robertson et al., 2004). Thus, in addition to testing the above hypotheses, we chose to explore whether other demographic and psychosocial variables could contribute to the prediction of symptoms of depression at three months postpartum in the women in our community sample.

Method

Design and Procedure

This study is part of a larger research project, "Nutrition and mental health in the puerperium and infancy," which is an ongoing, interdisciplinary research project carried out by the Regional Centre for Child and Youth Mental Health and Child Welfare and the National Institute of Nutrition and Seafood Research. The purpose of the project is to

investigate biological and psychosocial risk factors for mental health problems during

pregnancy and after delivery, as well as to establish how these factors influence child

development during the first year postpartum. All women aged 18 years or older who

attended a routine check-up during the 24th or 28th week of their pregnancy at either of two

selected well-baby clinics in a municipality near Bergen, Norway, between March 2010 and

June 2011, were invited to participate in the main study. Additional participants were

recruited by a public health nurse at a routine home visit two weeks after delivery.

In the current study, we investigated the importance of prenatal psychosocial risk

factors for the development of symptoms of postpartum depression. Consequently, only data

from participants who were recruited prior to delivery were retained for analysis. The study

was longitudinal in design, with predictor variables measured during the 28th week of

pregnancy (Time 1) and outcome variables assessed three months postpartum (Time 2). At

each time point, participants were asked to complete an online questionnaire (see Appendix)

which assessed demographics, mental health, and various psychosocial variables. For the

purposes of the larger study, the questionnaires also contained questions regarding nutrition

and dietary habits, and the Time 2 version included additional questions concerning infant

temperament. Participants were also requested to complete the Edinburgh Postnatal

Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) at a routine check-up at their local

well-baby clinic at Time 2.

The timing of the postpartum assessment was considered to be highly appropriate for

the purposes of this study. Onset of postpartum depression may reasonably be expected to

have occurred by three months after delivery (Cooper, Campbell, Day, Kennerley, & Bond,

1988), while this is still early enough in the postpartum period that it is unlikely that a large

proportion of depressed women would already have experienced spontaneous remission of

symptoms (Zelkowitz & Milet, 2001). Also, three months is certainly far enough removed in

time from delivery to allow us to be confident of avoiding the unintentional registration of

symptoms of maternity blues (Boyd, Le, & Somberg, 2005), which is a common, transitory

state characterized by dysphoria, mood lability, tearfulness, and anxiety, typically arising

within the first week postpartum and lasting up to approximately 10 days (Troutman &

Cutrona, 1990).

Participants

Fifty-five women completed the questionnaire at Time 1. Of these, 46 women (83.6

%) completed either the Time 2 questionnaire, or the EPDS, or both. These 46 women

constitute the sample for this study. At Time 1, these participants were between 19 and 41

years of age ($M = 29.11$, $SD = 4.84$). Just over half of the participants (53.3 %) were

primiparous, with the rest reporting up to three children ($M = 0.67$, $SD = 0.83$). Almost all

participants were married or cohabitants (95.5 %).

Measures

Gross annual income for participants and their partners is reported in Table 1.

Psychometric properties of the other major study variables, including range of possible and

actual scores, are reported in Table 2. Internal consistency of measures is reported in Table 3.

------ Insert Table 1 here ------

------ Insert Table 2 here ------

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Depression and anxiety. The Hospital Anxiety and Depression Scale (HADS;

Zigmond & Snaith, 1983) was utilized to assess symptoms of anxiety and depression at both

time points. The HADS is a 14-item self-report questionnaire designed to detect emotional

disturbance in nonpsychiatric hospital patients (Lisspers, Nygren, & Söderman, 1997). In

developing the scale, the authors excluded physical symptoms such as insomnia and fatigue in

order to avoid confounding depression or anxiety with somatic disorders (Bjelland et al.,

2002). Consequently, the majority of the items of the HADS measures cognitive and

emotional aspects of depression or anxiety (Lisspers et al., 1997).

The HADS is divided into two subscales, Anxiety (HADS-A) and Depression (HADS-

D). Each subscale consists of seven items that participants rate on a 4-point Likert scale

ranging from 0 to 3. Ratings are summed to yield a total score of 0-42 for the total scale and

separate scores of 0-21 for each subscale (Lisspers et al., 1997). Snaith and Zigmond (as

cited in Jomeen & Martin, 2004) recommend the use of the subscale scores as clinical

indicators, because the total HADS score provides only an indication of general emotional

disturbance. According to Zigmond and Snaith (1983), possible presence of clinically

relevant levels of anxiety or depression are indicated by scores of 8 or more on the HADS-A

or the HADS-D, respectively, whereas probable caseness is indicated by scores of 11 or

higher.

The HADS subscales appear to be reliable measures of anxiety and depression, with

various studies reporting Cronbach alpha coefficients of .78 to .93 for the HADS-A and of .82

to .90 for the HADS-D (Mykletun, Stordal, & Dahl, 2001). Lisspers et al. (1997) expressed

doubts concerning the validity of the HADS subscales, noting that well-known measures of

depression and anxiety such as the Beck Depression Inventory and the State-Trait Anxiety

Inventory correlate more strongly with the total HADS scale than with the relevant subscale.

However, Bjelland et al. (2002) found moderate to strong correlations (r = .60 to .80) between

several commonly used rating scales of depression and anxiety and the HADS-D and HADS-

A subscales, respectively, and concluded that the concurrent validity of the HADS is good to very good.

In the present study, Time 1 HADS-A and Time 1 HADS-D were utilized as predictor variables (labeled *prenatal anxiety* and *prenatal depression*, respectively), and Time 2 HADS-D was used as an outcome measure (labeled *postpartum HADS-D*).

A Norwegian version (Berle et al., 2003) of the EPDS (Cox et al., 1987) was administered as an additional outcome measure of depressive symptomatology at Time 2. The EPDS is a self-report questionnaire intended to be used to screen postpartum women for depression. It consists of 10 short statements of common symptoms of depression. Each item is rated on a 4-point Likert scale from 0 to 3 based on the degree to which the statement corresponds to the respondent's experience in the previous seven days (Glaze & Cox, 1991). The scale has been found to have good reliability in both the original (Tuohy & McVey, 2008) and the relevant Norwegian version (Berle et al., 2003). In their validation study, Cox et al. (1987) found that women who scored 13 or higher on the EPDS were most likely to be suffering from a depressive illness. The authors emphasized that a score below this cut-off does not guarantee the absence of depression, and suggested that a threshold of 10 may be more appropriate in situations where it is important to avoid false negative cases (Cox et al., 1987). In their validation study of their Norwegian version of the EPDS, Berle et al. (2003) concluded that a cut-off score of 11 was ideal to detect major and minor depression in research settings.

Cox et al. (1987) stressed the unidimensional nature of the EPDS. Berle et al. (2003) investigated the psychometric properties of their Norwegian translation of the EPDS and found support for a unidimensional factor structure. Other studies, however, have indicated that the EPDS consists of two (Brouwers, van Baar, & Pop, 2001; Guedeney & Fermanian, 1998; Pop, Komproe, & van Son, 1992) or three (Tuohy & McVey, 2008) separate factors,

with the implication being that high EPDS-scores may reflect symptoms of anxiety in addition to or instead of depression. Furthermore, the EPDS may not only fail to distinguish anxiety from depression or to differentiate between different degrees of severity of these conditions (Rowe, Fisher, & Loh, 2008), but it may also be unable to detect those depressive states which are mainly characterized by psychomotor retardation (Guedeney, Fermanian, Guelfi, & Kumar, 2000).

History of depression. Participants' history of depression was measured using five items previously used by Kendler, Neale, Kessler, Heath, and Eaves (1993) to measure lifetime history of depression. Participants were asked whether they had previously experienced each of five common symptoms of depression. Additionally, they were requested to indicate whether they had experienced three or more symptoms simultaneously, and if so, to specify the duration of the most persistent depressive episode. The six items were scored (*no* = 0 and *yes* = 1) and summed.

Self-esteem. Four items from Rosenberg's Self-Esteem Scale (Rosenberg, 1965) were used to measure self-esteem. According to Rosenberg (1965), high self-esteem implies that individuals respect themselves and consider themselves good enough, not necessarily better than others but certainly not worse. Conversely, poor self-esteem involves self-rejection, a lack of self-respect, and a desire to be different (Rosenberg, 1965). The Norwegian version of Rosenberg's Self-Esteem Scale has been found to have good validity (von Soest, 2005). The complete scale consists of 10 items, but for the purposes of the current study, four of these were selected. Participants rated each item on a 4-point Likert scale from 1 (*strongly agree*) to 4 (*strongly disagree*). The self-esteem variable was calculated as the mean score of these four items.

Satisfaction with life. Participants' satisfaction with life was measured using the Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). Pavot and Diener

(1993) define satisfaction with life as a cognitive aspect of subjective well-being. Unlike instruments that assess the presence of affective well-being or negative affective states such as depression, the Satisfaction With Life Scale is based on a conscious, cognitive judgmental process where individuals assess the quality of their own lives based on self-selected criteria, and the scale may thus represent a valuable complement to measures of emotional well-being or psychopathology (Pavot & Diener, 1993). The scale consists of five items that are rated on a 7-point Likert scale from 1 (*completely disagree*) to 7 (*completely agree*). We calculated mean scores for the satisfaction with life variable. Pavot and Diener (1993) argue that the Satisfaction With Life Scale shows good convergent and discriminant validity. Diener et al. (1985) found good internal reliability as well as moderate temporal stability on the one hand, yet adequate sensitivity to detect changes in life satisfaction over time on the other.

Adverse life events. Participants' exposure to adverse life events, such as accidents or serious illness in the family, was measured using questions from the Norwegian Mother and Child Cohort Study (Magnus et al., 2006; The Norwegian Institute of Public Health, n.d.a) and items from Coddington's (1972) lists of life events. Participants indicated whether or not they had experienced each of nine adverse life events during the past year (*no* = 0 and *yes* = 1). Scores were summed.

Relationship satisfaction. Participants' satisfaction with their romantic relationship was assessed using 10 questions from the Norwegian Mother and Child Cohort Study (Magnus et al., 2006; The Norwegian Institute of Public Health, n.d.a). Seven of these questions were modified versions of items from Mehrabian's Marital Satisfaction Scale (Blum & Mehrabian, 1999), whereas three questions were created specifically for use in the Norwegian Mother and Child Cohort Study. All questions were answered using a 6-point Likert scale from 1 (*completely agree*) to 6 (*completely disagree*) and mean scores were calculated.

Social support. Social support from friends and family was measured using two indices. Emotional support was assessed using six questions regarding participants' perception of closeness and attachment to their friends and family, as well as to what degree they felt appreciated and valued by them. Instrumental support was measured with two questions regarding how frequently participants received help from friends and family. These questions were previously used in the study "Tracing Opportunities and Problems in Childhood and Adolescence" (the TOPP study; The Norwegian Institute of Public Health, n.d.b) and were based on research carried out by Dalgard, Bjørk, and Tambs (1995). All questions were rated on a 5-point Likert scale and a total score for each index was calculated.

Statistical Strategy

Data were coded and analyzed using the statistics software package SPSS version 19.0 for Windows. Results were considered statistically significant when $p < .05$. We first examined the bivariate correlations between predictor variables and outcome variables. Predictor variables that correlated significantly with an outcome variable were retained for further analysis. Next, to test hypothesis H1 regarding effects of symptoms of prenatal depression and anxiety, as well as to investigate possible main effects of social support (related to H2) and to explore whether additional psychosocial variables could predict symptoms of postpartum depression, we performed standard multiple regression analyses for each outcome variable. For each multiple regression model, predictor variables were chosen on the basis of significant bivariate correlation with the selected outcome variable (i.e., postpartum HADS-D or EPDS). Next, to test for possible buffer effects of social support (H2), we performed hierarchical multiple regression analyses. Prior to creating interaction variables for these analyses, we transformed data from all the involved variables into z-scores. This was done in order to facilitate meaningful interpretation of results and also to reduce any multicollinearity between predictor variables. Finally, significant predictor variables from the

standard multiple regression analyses and significant interactional predictor variables from the hierarchical multiple regression analyses were entered in comprehensive hierarchical multiple regression models. This was done in order to ascertain the relative importance of predictor variables in predicting postpartum depression scores.

Ethics

The study was approved by the Regional Committees for Medical and Health Research Ethics. Informed consent was obtained from all participants. Participants were informed of their right to withdraw from the study at any point. All collected data were treated confidentially. On inclusion in the study, participants received a unique ID number which was used for all data collection. ID numbers were stored separately from sensitive information to ensure that no participants could be identified.

<div align="center">Results</div>

Preliminary Analyses

Tests of normality. Kolmogorov-Smirnov tests showed that, with the exception of age, no variables were normally distributed. This was not unexpected, considering the nature of the variables and the relatively small size of our sample. To investigate how variables deviated from normality, histograms for each variable were inspected visually and compared with skewness and kurtosis values. Results of these tests of normality are displayed in Table 4. As there is considerable controversy associated with transforming non-normally distributed variables to better meet the assumptions of parametric techniques (Pallant, 2010), we opted to avoid this. We investigated residual statistics in conjunction with our multiple regression analyses to ensure that the non-normally distributed variables did not render the models invalid. These preliminary analyses did not reveal problems related to assumptions of normality, linearity, multicollinearity and homoscedasticity.

------ Insert Table 4 here ------

Attrition analysis. Statistical analyses were carried out in order to ascertain whether

there were significant differences in prenatal anxiety or depression scores or demographics

between the 46 women who completed measures at both time points (completers) and the nine

women who completed only the Time 1 questionnaire (noncompleters). Fisher's exact test

(two-tailed) showed no significant differences between completers and noncompleters in

education level ($p = .258$), which was a dichotomized variable indicating whether or not

participants had at least some higher education beyond a high school diploma, or employment

status ($p = .321$), which was a dichotomized variable indicating whether or not participants

worked full-time (i.e., 80-100 %). Independent samples t tests showed no significant

differences between completers and noncompleters in mean age, prenatal depression scores,

or prenatal anxiety scores (see Table 5).

------ Insert Table 5 here ------

Bivariate correlations. Preliminary bivariate correlation analyses were carried out in

order to investigate relationships between Time 1 predictor variables and Time 2 outcome

variables. Correlation coefficients are displayed in Table 6. As these results show, having a

partner with lower income, experiencing lower levels of emotional support from one's friends

and family, having lower life satisfaction and poorer self-esteem, and experiencing more

symptoms of anxiety and depression during pregnancy were significantly associated with

higher HADS-D scores three months postpartum. Likewise, it is shown that experiencing

more symptoms of anxiety and more symptoms of depression during pregnancy were

significantly associated with higher scores on the EPDS three months after delivery.

------ Insert Table 6 here ------

Standard Multiple Regression Analyses

Standard multiple regression was used to assess the ability of specific predictor variables to predict levels of depression as measured by the different outcome variables (i.e., postpartum HADS-D and EPDS), while controlling for the influence of the other selected predictor variables. Predictor variables were chosen on the basis of being significantly correlated with the outcome measure of interest (see Table 6).

EPDS. Prenatal anxiety and prenatal depression were entered simultaneously into the regression equation to predict EPDS scores. The results of the multiple regression analysis are displayed in Table 7. The total variance explained by the model as a whole was 22.1 % (p = .019). Neither of the predictor variables were statistically significant.

------ Insert Table 7 here ------

Postpartum HADS-D. Partner's income, emotional support, satisfaction with life, self-esteem, prenatal anxiety, and prenatal depression were entered simultaneously into the regression equation to predict postpartum HADS-D scores. The results of the multiple regression analysis are displayed in Table 8. The total variance explained by the model as a whole was 44.6 % (p = .001). In this model, only partner's income (β = -.30, p = .043) was statistically significant.

------ Insert Table 8 here ------

Hierarchical Multiple Regression Analyses: Exploring Interactions

In order to investigate whether social support would interact with adverse life events or prenatal mental health to predict postpartum depression symptoms, we conducted 12 hierarchical multiple regression analyses. We first transformed the relevant data into *z*-scores. Then, for each outcome variable (i.e., postpartum HADS-D and EPDS), one social support variable (i.e., emotional support or instrumental support) and one stressor or mental health variable (i.e., adverse life events, prenatal anxiety, or prenatal depression) were entered into the regression equation at Step 1. We computed a product term of the selected social support variable and the selected stressor or mental health variable as a representation of the interaction of these variables, and entered this variable into the regression equation at Step 2.

EPDS. None of the six regression models in which EPDS was the outcome variable were significantly improved by entering an interaction variable in Step 2. That is, none of the interaction variables made a statistically significant contribution to the prediction of EPDS scores, after controlling for the individual predictor variables of which the interaction variable was a product.

Postpartum HADS-D. First, hierarchical multiple regression was used to assess the ability of the interaction variable Prenatal Anxiety x Emotional Support to predict levels of depression (postpartum HADS-D), after controlling for the influence of prenatal anxiety and emotional support. Prenatal anxiety and emotional support were entered into the equation at Step 1, explaining 28.0 % of the variance in depression. After entry of the interaction variable Prenatal Anxiety x Emotional Support at Step 2, the total variance explained by the model as a whole was 38.5 %, $F(3, 38) = 7.93$, $p < .001$. The interaction variable explained an additional 10.5 % of the variance in depression, after controlling for prenatal anxiety and emotional support, $\Delta R^2 = .105$, $F(1, 38) = 6.51$, $p = .015$. In the final model, both prenatal

anxiety (β = .37, p = .007) and the interaction variable Prenatal Anxiety x Emotional Support (β = -.33, p = .015) were statistically significant.

The derived regression equation was used to predict values of postpartum HADS-D based on combinations of high or low levels of prenatal anxiety and high or low levels of emotional support (see Figure 1). High and low levels of each variable were operationalized as one standard deviation above the mean and one standard deviation below the mean, respectively. As shown in Figure 1, women with high levels of prenatal anxiety generally exhibited higher symptom levels of postpartum depression than did women with low levels of prenatal anxiety, but the effect of prenatal anxiety on postpartum depression was moderated by level of emotional support. Among women with low levels of prenatal anxiety, there was little difference in postpartum depression scores between those receiving high levels and those receiving low levels of emotional support. Among those women reporting high levels of prenatal anxiety, however, those reporting low levels of emotional support exhibited markedly higher postpartum depression scores than did those reporting high levels of emotional support.

------ Insert Figure 1 here ------

Next, hierarchical multiple regression was used to assess the ability of the interaction variable Prenatal Anxiety x Instrumental Support to predict levels of depression (postpartum HADS-D), after controlling for the influence of prenatal anxiety and instrumental support. Prenatal anxiety and instrumental support were entered into the equation at Step 1, explaining 21.7 % of the variance in depression. After entry of the interaction variable Prenatal Anxiety x Instrumental Support at Step 2, the total variance explained by the model as a whole was 32.2 %, $F(3, 39) = 6.19$, p = .002. The interaction variable explained an additional 10.5 % of

the variance in depression, after controlling for prenatal anxiety and instrumental support, ΔR^2 = .105, $F(1, 39) = 6.06$, $p = .018$. In the final model, both prenatal anxiety ($\beta = .34$, $p = .020$) and the interaction variable Prenatal Anxiety x Instrumental Support ($\beta = .25$, $p = .018$) were statistically significant.

The derived regression equation was used to predict values of postpartum HADS-D based on combinations of high or low levels of prenatal anxiety and high or low levels of instrumental support (see Figure 2), with high and low levels of each variable operationalized as one standard deviation above the mean and one standard deviation below the mean, respectively. As shown in Figure 2, among women reporting low levels of prenatal anxiety, those receiving low levels of instrumental support exhibited somewhat higher postpartum depression scores than did those receiving high levels of instrumental support. Among women reporting high levels of prenatal anxiety, however, the effect of instrumental support was opposite: Those receiving high levels of instrumental support during pregnancy subsequently reported markedly higher postpartum depression scores than did those receiving low levels of instrumental support.

------ Insert Figure 2 here ------

None of the other four regression models in which postpartum HADS-D was the outcome variable were significantly improved by entering an interaction variable in Step 2. That is, none of the other interaction variables made a statistically significant contribution to the prediction of postpartum HADS-D scores, after controlling for the individual predictor variables of which the interaction variable was a product.

Hierarchical Multiple Regression Analyses: Assessing Relative Importance of Predictors

In order to investigate the relative importance of the different predictor variables for the prediction of postpartum depression, two further hierarchical multiple regression analyses were carried out. Only postpartum HADS-D was used as outcome variable, because no significant interaction effects were found in previous hierarchical multiple regression analyses when using EPDS as the outcome variable.

For each analysis, partner's income—which was the only statistically significant predictor variable in the previously conducted standard multiple regression analysis for postpartum HADS-D—was entered into the regression equation at Step 1. Next, one of the two interaction variables that were statistically significant in the previously conducted hierarchical multiple regression analyses for postpartum HADS-D (i.e., either Prenatal Anxiety x Emotional Support or Prenatal Anxiety x Instrumental Support) was entered at Step 2. Note that the two predictor variables of which the selected interaction variable was a product term (i.e., prenatal anxiety and either emotional support or instrumental support) were also entered at Step 1, in order that they might be controlled for when the interaction variable was entered at Step 2.

In the first analysis, partner's income, prenatal anxiety, and emotional support were entered at Step 1, explaining 37.8 % of the variance in postpartum HADS-D scores. After entry of the interaction variable Prenatal Anxiety x Emotional Support at Step 2, the total variance explained by the model as a whole was 47.0 %, $F(4, 37) = 8.20$, $p < .001$. The interaction variable explained an additional 9.2 % of the variance in depression, after controlling for partner's income, prenatal anxiety, and emotional support, $\Delta R^2 = .092$, $F(1, 37) = 6.42$, $p = .016$. In the final model, partner's income ($\beta = -.32$, $p = .020$), Prenatal Anxiety x Emotional Support ($\beta = -.31$, $p = .016$), and prenatal anxiety ($\beta = .30$, $p = .026$) were all statistically significant.

In the second analysis, partner's income, prenatal anxiety, and instrumental support were entered at Step 1, explaining 36.1 % of the variance in postpartum HADS-D scores. After entry of the interaction variable Prenatal Anxiety x Instrumental Support at Step 2, the total variance explained by the model as a whole was 42.3 %, $F(4, 37) = 6.77$, $p < .001$. The interaction variable explained an additional 6.2 % of the variance in depression, after controlling for partner's income, prenatal anxiety, and instrumental support, but this increase was not significant, $\Delta R^2 = .062$, $F(1, 37) = 3.95$, $p = .054$. In the final model, only partner's income ($\beta = -.34$, $p = .016$) was statistically significant.

Discussion

To summarize, the main results were, first, that prenatal symptoms of anxiety and prenatal symptoms of depression together predicted postpartum EPDS scores, although neither prenatal anxiety nor prenatal depression made a statistically significant independent contribution to explained variance of EPDS scores for our sample. Second, using HADS-D as the outcome variable, we found a main effect showing that women with higher levels of prenatal anxiety exhibited higher symptom levels of postpartum depression, but we also found that this relationship was modified by social support. Specifically, we found that emotional support and instrumental support interacted with prenatal anxiety to influence postpartum depression symptom levels in very different ways: For women with higher levels of prenatal anxiety, receiving more emotional support acted as a protective buffer against symptoms of depression, whereas increased instrumental support was associated with increased symptom levels. Third and finally, our results showed that women's postpartum HADS-D scores were lower when their partners' income level was higher. Analyses indicated that the most important predictors of postpartum depression symptoms in the current study were prenatal anxiety and depression symptoms (for postpartum depression as measured by the EPDS) and

partner's income and the interaction between prenatal anxiety and emotional support (for postpartum depression as assessed by the HADS-D).

Predictors of EPDS Score

Supporting hypothesis H1 and in line with the findings of previous studies (Leigh & Milgrom, 2008; Robertson et al., 2004; Sutter-Dallay et al., 2004), we found that prenatal symptoms of anxiety and prenatal symptoms of depression together predicted postpartum EPDS score. It should be noted, however, that although the regression model of EPDS on prenatal anxiety and prenatal depression was statistically significant as a whole, neither prenatal anxiety nor prenatal depression made a statistically significant independent contribution to the explained variance of EPDS scores after controlling for the effect of the other predictor variable. This could be due to a large proportion of the explained variance being shared between the two HADS subscales. Moreover, as indicated by the beta weights for prenatal anxiety and prenatal depression in the model (see Table 7), the effect sizes in question are small to moderate. Considering that statistical power for this analysis was limited by the relatively small number of women who completed the EPDS ($n = 35$), it is perhaps not surprising that the individual contributions of prenatal anxiety and prenatal depression did not achieve statistical significance.

Somewhat surprisingly, we did not find that any psychosocial variables except prenatal anxiety and prenatal depression were significantly associated with postpartum EPDS scores. This is in opposition to hypothesis H2 that low levels of social support during pregnancy would predict symptoms of postpartum depression, and is contrary to results from previous research showing that factors such as dissatisfaction with the marital relationship (Zelkowitz et al., 2008), poor social support (Rubertsson, Waldenström, et al., 2005), low income (Abbott & Williams, 2006; Righetti-Veltema et al., 1998) and adverse life events (Eberhard-Gran et al., 2002; Rubertsson, Wickberg, Gustavsson, & Rådestad, 2005) can

predict EPDS scores. With this in mind, it seems improbable that our results are best explained by a true absence of relationship between the psychosocial variables we measured in pregnancy and postpartum EPDS scores. We think it more likely that we may attribute our null results at least partly to our limited sample size and perhaps also to certain characteristics of our sample. For instance, the range of EPDS scores as well as of scores on several predictor variables is conspicuously narrow. This might also go some way toward explaining why we failed to find any significant interaction effects in our hierarchical multiple regression analyses when using the EPDS as the outcome variable.

Prenatal Anxiety, Prenatal Depression, Adverse Life Events, and Social Support

Prenatal anxiety and social support. Our results showed that women with higher symptom levels of prenatal anxiety exhibited higher symptom levels of postpartum depression measured by HADS-D. However, we also found that the relationship between prenatal anxiety and postpartum depression symptoms was modified by emotional support. In our hierarchical multiple regression analysis, the interaction between prenatal anxiety and emotional support made a statistically significant contribution to the explained variance of postpartum HADS-D scores when controlling for partner's income, prenatal anxiety, and emotional support. Thus, emotional support—in the form of feeling attached to, and valued by, one's friends and family—seems to exert a protective influence on the mental health of those women experiencing higher levels of anxiety in pregnancy, whilst having only a negligible impact on the postpartum HADS-D scores of women with lower prenatal anxiety scores. This finding lends some support to hypothesis H2 in that a lower level of emotional support predicts elevated symptoms of postpartum depression, albeit only for a subgroup of women. It also helps us to understand how social support affects postpartum depressive symptomatology, providing support for the buffering hypothesis: Emotional support appears

to protect women against the adverse effects of prenatal anxiety on postpartum depression symptom levels.

Research suggests that more anxious women seek more social support than do less anxious women (Tietjen & Bradley, 1985). It seems likely that the presence of prenatal anxiety increases women's perceived need for support, and that this, coupled with the perception that support is unavailable, could lead to depression. Perhaps those anxious women who feel emotionally supported by their family and friends during their pregnancy are reassured by the perception that they have solid relationships with people who are willing and able to provide help should it be required, and consequently they do not develop postpartum depression despite their elevated anxiety levels. This interpretation is in line with the thinking of Kessler and McLeod (1985) and Wethington and Kessler (1986). Those women reporting very low prenatal anxiety levels may not experience an equal degree of need for support, in which case the perception of available support—or lack thereof—might not have a corresponding effect on their postpartum mental health.

Another possible mechanism through which emotional support protects against postpartum depression in women with higher levels of prenatal anxiety is the enhancement of self-efficacy. Bandura (1997) states that, on a group level, anxious people have significantly lower self-efficacy than nonanxious people have. Further, A. T. Beck and Clark (1991) claim that more anxious individuals experience a greater degree of vulnerability and tend to underestimate their own capabilities when in situations they perceive as threatening. The majority of women in our sample were expecting their first child when they completed the Time 1 questionnaire, and were thus about to take on an unfamiliar role and a host of new demands. The multiparous women also faced new challenges associated with caring for a growing family. We did not measure self-efficacy in this study. However, in light of the link between anxiety and self-efficacy, and considering the novelty and potentially stressful

aspects of the participants' situation, it seems reasonable to assume that those women reporting higher levels of prenatal anxiety also had lower levels of self-efficacy. Bandura (1997) argued that low self-efficacy can lead to depression, and, in line with this, Olioff and Aboud (1991) found that low parenting self-efficacy can predispose women to postpartum dysphoria. Perhaps emotional support from friends and family protects against depression by increasing the more anxious women's self-esteem through positive feedback regarding their capabilities. This line of reasoning is in keeping with the findings of Haslam, Pakenham, and Smith (2006) as well as those of Cutrona and Troutman (1986).

The interaction of prenatal anxiety with instrumental support was found to predict postpartum HADS-D scores in one of our hierarchical multiple regression analyses. Our results indicate that for women experiencing low levels of anxiety during pregnancy, the receipt of instrumental support from family and friends appears to serve a protective function with regard to development of postpartum depression. For women who report higher levels of prenatal anxiety, however, the reverse seems to be the case: Those who receive more instrumental support tend to report higher postpartum HADS-D scores. This is contrary to the buffer effect we found when investigating the role of emotional support in the development of postpartum depression, and would seem to be in conflict with hypothesis H2, which states that lower levels of social support will predict elevated symptom levels of depression three months postpartum.

One possible explanation of our result is that instrumental support affects women's self-efficacy differentially depending on their level of anxiety, and that self-efficacy, in turn, is of importance in the development of symptoms of depression. We have previously suggested that emotional support may protect the more anxious women from depression by enhancing their self-efficacy. According to Haslam et al. (2006), instrumental support can serve much the same function, increasing self-efficacy via the modeling of coping skills and

thus reducing the risk of depression. Our results indicate a rather different relationship, however, in that instrumental support given to more anxious women results in higher postpartum depression scores. Thus, contrary to the interpretation espoused by Haslam et al. (2006), we suggest that, unlike emotional support, instrumental support may reduce the self-efficacy of the more anxious women because they may interpret practical aid as evidence that others judge them to be incompetent and in need of help.

Research suggests that mental health is affected differently by visible social support and invisible social support (Shrout, Herman, & Bolger, 2006). Bolger, Zuckerman, and Kessler (2000) found that invisible support reduced recipients' depressed mood whereas visible support predicted an increase in depression over time. Howland and Simpson (2010) and Bolger and Amarel (2007) contend that this pattern may be caused by the negative effect of visible support on recipients' self-efficacy. In keeping with this line of reasoning, we imagine that our two social support variables differ with regard to visibility, that they consequently differ in their effect on self-efficacy, and that this, in turn, results in different effects on participants' postpartum depression scores. Specifically, we posit that our emotional support variable may reflect a form of help that can easily go unnoticed by the recipient. As Pearlin (1985) argued, emotional support may be perceived as a quality of close relationships rather than as aid, and thus it allows the recipient to retain a sense of self-reliance. Conversely, our instrumental support variable may reflect a more noticeable form of help that may have the unintended consequence of making the receiver feel less self-efficacious and more dependent on others. Further, as anxiety is associated with a negative bias in the processing of personally relevant information (Bandura, 1997), the more anxious women might be particularly prone to interpreting perceived aid in a negative manner. In this way, instrumental support from friends and family, being a noticeable form of help, could have a deleterious impact on the self-efficacy beliefs of the more anxious women, with the

subsequent development of symptoms of depression as an unintended result. We imagine that women reporting very low levels of prenatal anxiety might be secure enough in their evaluations of their own capabilities that their self-efficacy beliefs are not as easily affected in a negative way by receiving help from their friends and family. This would explain why the less anxious women in our sample did not display elevated postpartum depression scores when receiving more instrumental support.

It should be noted that, although statistically significant in the hierarchical multiple regression analysis of postpartum HADS-D after controlling for prenatal anxiety and instrumental support, the interaction variable did not remain significant when partner's income was included in the model. It seems, then, that the effect of partner's income is sufficiently powerful to overshadow the effect of the interaction between prenatal anxiety and instrumental support on postpartum depression symptom level.

To summarize, social support did not have a direct effect on postpartum depression symptom levels in this study, but there was a direct adverse effect of higher levels of prenatal anxiety on postpartum HADS-D scores. We also found interaction effects between prenatal anxiety and social support. Specifically, women who experienced higher levels of anxiety during pregnancy in combination with less emotional support and/or more instrumental support from friends and family tended to report higher HADS-D scores three months postpartum. Thus, our results are mixed with regard to support for our hypotheses. Higher prenatal anxiety levels do predict postpartum depressive symptomatology, in line with hypothesis H1, although the effect is moderated by social support. When it comes to hypothesis H2, we find that level of social support is associated with symptom level of postpartum depression, but not directly, and, when interacting with prenatal anxiety, only emotional support serves a protective function, while instrumental support potentiates the adverse effects of prenatal anxiety on postpartum depression. Though not providing

unqualified support for our hypotheses, our results contribute to a more detailed understanding of under what conditions anxiety and social support may influence postpartum depression.

Prenatal depression and social support. In contrast to results from a number of other studies showing that prenatal depression predicts postpartum depression (Affonso et al., 1991; Leigh & Milgrom, 2008; Milgrom et al., 2008; Rubertsson, Wickberg, et al., 2005; Stowe & Nemeroff, 1995; Verkerk et al., 2003), and in opposition to hypothesis H1, prenatal depression did not predict postpartum HADS-D scores in this study, neither directly nor in interaction with social support. Possibly, these null results are due to the rather small size of our sample relative to the number of variables that we included in our regression models, leaving us with insufficient statistical power to detect potential associations of only moderate size. Alternatively, it is possible that prenatal depression really is of limited value as a predictor of postpartum depression, as has been argued by Edwards et al. (2008). For our sample, it seems that prenatal anxiety, and the interactions of prenatal anxiety with emotional and instrumental support are better predictors of postpartum depression than is prenatal depression.

Adverse life events and social support. In this study, no associations were found between adverse life events and scores on either postpartum HADS-D or EPDS. Further, we did not detect any interaction effects of adverse life events with social support on symptom levels of postpartum depression. It is possible that our null results are due to certain characteristics of our sample, rather than reflecting a true absence of association between adverse life events, social support, and postpartum depression. Rubertsson, Wickberg, et al. (2005) found that experiencing two or more adverse life events in the year prior to pregnancy was significantly associated with elevated depression scores after delivery. However, the vast majority (84.8 %) of our participants reported fewer than two adverse life events in the year

prior to the study. Perhaps the women in our sample simply did not experience enough adverse life events for this variable to have an impact on measures of postpartum depression. It is possible that social support would have a protective effect against postpartum depression for women experiencing a greater number of adverse life events.

Partner's Income and Postpartum Depression

Partner's income was a statistically significant predictor of postpartum HADS-D scores in several of our multiple regression analyses, suggesting that family finances are related to postpartum depression. Research shows that low income is a stressor that may lead to poorer coping behaviors (Wicki, 1999) and an increased risk of depression (Dearing, Taylor, & McCartney, 2004; Kosidou et al., 2011). Individuals with access to greater financial resources may avoid this source of stress and consequently also escape the deleterious effects of financial strain on mental health. This line of thinking is supported by studies showing that an increase in family income is associated with a reduction in symptoms of depression (Dearing et al., 2004) and that belonging to the highest household income category seems to be particularly protective against depression in women (Glynn, MacLean, Forte, & Cohen, 2009; Kosidou et al., 2011). In addition to avoiding stressors associated with financial strain, having access to greater financial resources allows individuals to purchase household services, thus reducing their workload and alleviating the stress associated with multiple role responsibilities (Kosidou et al., 2011; Wicki, 1999). Couples with adequate financial resources also have the freedom of choosing whether or not—and to what degree— both partners will engage in paid work during the first few years of their child's life (Wicki, 1999). Thus, a high household income can reduce stressors and associated mental health problems both directly and indirectly.

Whereas income has been shown to have a fairly large influence on depression among people whose earnings are relatively low (Dearing et al., 2004), there is some evidence that

increasing wealth beyond a certain threshold has only limited impact on mental health (Beard, Tracy, Vlahov, & Galea, 2008). The level of this threshold varies across studies, as one might expect from the corresponding variation in sociocultural circumstances, but some researchers claim that the income threshold is relatively low (Dearing et al., 2004). Kosidou et al. (2011), on the other hand, did not find this kind of threshold, but instead reported protective effects of very high income levels. For their sample of Swedish women, only those 25 % belonging to the highest household disposable income category had a significantly reduced risk of depressive illness. The majority of participants in our sample were employed in paid work, and most were married to or cohabiting with a partner whose income level was relatively high. If there were a low threshold beyond which increases in income would not make much difference for mental health, one might expect not to find an association between income and depression for our relatively affluent sample. However, our results indicate that even within this group of women, a better financial situation—in the form of one's partner's income being higher—is protective against depressive symptoms.

Quite possibly, the first postpartum year is a period where the family's finances are of particular importance to women's mental health. The birth of a child constitutes a new financial situation for the family, with concurrent changes in the roles and responsibilities of each individual family member. Wicki (1999) points out that new mothers and fathers must assume their parental obligations immediately after birth, and that the utility of available resources therefore quickly becomes apparent. In keeping with this, we imagine that a new mother, being anxious to provide for her infant, will be concerned with whether she and her partner together have access to adequate financial resources. Because of her preoccupation with caring for her child, we imagine that a limited source of income is a particularly salient stressor during the postpartum period.

In this study, partner's income was a significant predictor of participants' postpartum HADS-D scores, whereas women's own income was not associated with their postpartum depression scores. This does not necessarily mean that there is no relationship between a woman's income and her mental health. Perhaps we simply did not detect an association because of inadequate statistical power due to our small sample size. Alternatively, the null result may be due to specific characteristics of our sample. Practically all our participants were married or cohabiters, and the majority of partners had high salaries. Consequently, a large portion of the collective household income was attributable to the partner's earnings. We imagine that women's own income would be of far greater importance for their mental health if their financial situation were more difficult or if they were the principal earners of their family, as might be the case for women who are single or whose partner is unemployed.

It is also possible that our results correctly reflect that a partner's income is of greater importance in predicting postpartum depression than is a woman's own income. Men generally earn more than women do (Plantin, 2007), and fathers are still the principal earners in many Norwegian families (Dommermuth & Kitterød, 2009). Therefore, in the event that the family situation demands that a parent spend more time at home, it makes financial sense for the woman to reduce her working hours or give up her job (Lappegard, 2008; Plantin, 2007; Statistics Norway, 2007). This is reflected in statistics showing that mothers still claim the majority of parental leave and that many women choose to work part-time for several years after the birth of a child (Dommermuth & Kitterød, 2009; Statistics Norway, 2007). Many mothers of young children therefore experience an extended period of reduced personal income. During these years, it is likely that men's income has a far greater influence than women's income on families' financial situation. For our sample, too, it is apparent that women generally earned less than their partners did, and it is possible that the women were conscious of the fact that the partner's salary would be the most important and most stable

source of income for the entire family in the years to come. Thus, to the extent that income affects postpartum mental health, it is possible that a woman's partner's income is a more salient and important predictor of depression than her own income is.

There has been some debate in the literature as to whether income affects depression, whether depression affects income, or whether observed associations are best explained by the influence of third variables (Zimmerman & Katon, 2005). Our analyses do not permit conclusions regarding a possible effect of depression on income. It is possible that our results reflect the effect of income on depression, as we have suggested above and in line with results reported by Dearing et al. (2004). Alternatively, our findings could be understood as the result of the influence of third variables on both women's postpartum mental health and their partners' income. For example, poor mental health could affect a man's capacity for labor, hence limiting his income, while simultaneously exerting a deleterious influence on his partner's level of depression. However, determining the precise nature of the relationship between income and mental health is beyond the scope of the current investigation.

Comparison of the EPDS and the HADS-D

In the current study, we found that different psychosocial variables predicted postpartum scores on the EPDS and the HADS-D. From this, we infer that the two scales measure different aspects of mental health problems. Whereas the HADS-D was developed with a view to assessing depression in hospital patients and is a more general measure of depression, the EPDS is specifically directed toward identifying postpartum depression. Some researchers have suggested that the use of general depression measures to assess postpartum depression is problematic (C. T. Beck & Gable, 2001). Cox et al. (1987) pointed out that, as most general measures of depression include items concerning somatic symptoms, which may be confounded with the normal sequelae of childbirth, there is a need for scales that are specifically designed to detect postpartum depression; hence, the development of the

EPDS. Our findings might then be taken as an indication that symptoms of postpartum

depression differ from symptoms of nonpostpartum depression, and that the two forms of

depression have somewhat different risk factors. However, we would point out that, unlike

many other general measures of depression and anxiety, the HADS does not assess somatic

symptoms (Bjelland et al., 2002), and that the EPDS is partly composed of items sourced

from the HADS-D (Cox et al., 1987). Furthermore, there is little evidence to suggest that

postpartum depression differs significantly from other forms of depression, except in terms of

severity (Whiffen & Gotlib, 1993). As has been mentioned, neither the DSM-IV nor the ICD-

10 distinguishes between postpartum and nonpostpartum depression in terms of symptoms.

Perhaps, then, our results are not due to differences between postpartum and nonpostpartum

forms of depression, but rather that the EPDS and the HADS-D measure different concepts.

For instance, some researchers have suggested that the EPDS may assess symptoms of

anxiety as well as of depression (Brouwers et al., 2001; Tuohy & McVey, 2008), in which

case it would not be surprising that predictors of EPDS scores would differ from predictors of

HADS-D scores. Alternatively, it is possible that the EPDS and the HADS-D measure

slightly different aspects of the same concept. For instance, Condon and Corkindale (1997)

pointed out that the HADS-D contains only items referring to the absence of positive mood,

whereas the EPDS enquires about both positive and negative mood states. Considering the

evidence that positive and negative affect form independent dimensions of affect (Watson,

Clark, & Tellegen, 1988), we would expect results when depression is assessed based on both

the absence of positive moods and the presence of negative moods (i.e., using the EPDS) to

be quite different from results when depression is assessed merely as the absence of positive

moods (i.e., using the HADS-D). This is in line with the thinking of Condon and Corkindale

(1997). Determining whether the EPDS and the HADS-D measure different concepts, assess

different aspects of the same form of psychopathology, or whether they reflect the fact that

postpartum depression differs from nonpostpartum depression, is beyond the scope of the

present study. All three possibilities would account for our finding that the variables that

predicted postpartum EPDS scores differed from those that predicted postpartum HADS-D

scores.

Strengths and Limitations

This study was longitudinal in design, which allows us to be more confident about the

directionality between variables. Also, we have used several internationally acknowledged

and validated instruments, including the HADS and the EPDS. This lends credibility to our

results and makes it more likely that our results truly reflect those relationships that we

wished to investigate. At the same time, however, it must be noted that several of the

variables we have included in our analyses were assessed using nonvalidated combinations of

items from different scales. We cannot be certain that these variables do in fact measure what

we have intended to measure. Furthermore, the use of nonvalidated instruments makes it

more difficult to compare our findings with the results of other studies.

It should be noted that, for our measures of emotional support, instrumental support,

and both prenatal and postpartum HADS-D, the Cronbach alpha coefficients are lower than

the often-recommended level of .70 (George & Mallery, 2003), which might be taken as an

indication of problems with internal consistency. However, Cronbach alpha values are

sensitive to the number of items in the scale (McDowell, 2006). With scales consisting of a

small number of items—like our measures of social support and HADS-D—it may be more

appropriate to consider mean inter-item correlation values when assessing reliability (Pallant,

2010). As may be seen in Table 3, the mean inter-item correlation values for the four

measures vary from .21 to .51, which we consider acceptable based on the recommendations

of Clark and Watson (1995) that state that the average inter-item correlation should fall in the

range of .15 to .50. Thus, despite low Cronbach alpha coefficient values, these measures may have acceptable internal consistency.

Our data are characterized by a limited variation in scores on most variables. Further, our sample size is relatively small. Thus, the statistical power of our analyses is limited, making it possible that we have failed to detect relationships between variables which would have attained significance with a larger sample size. Moreover, a certain number of cases per variable are required in order for results of multiple regression analyses to be generalized (Pallant, 2010). Tabachnick and Fidell (2001) recommend that the sample size is at least 50 plus eight times the number of variables to be included in the analysis. Clearly, the relatively small sample size of the present study limits the generalizability of our results. Generalizability is also reduced by our use of a convenience sample with particular characteristics. For instance, all the women in our sample were middle class adults and almost all were married. The sample is thus not representative of the entire population of pregnant or postpartum women. Had we used a larger and more varied sample which reflected the characteristics of the population more faithfully, our results might not only have been different, but they would also be more generalizable. On the other hand, results from our attrition analysis showed that there were no significant differences in demographics or prenatal symptoms of depression or anxiety between participants who completed questionnaires at both time points and participants who dropped out of the study after completing the prenatal questionnaire, which makes us more confident that our sample is representative of those pregnant women who initially agreed to participate in our study, and that our results have some generalizability.

In this study, we analyzed only relationships between psychosocial variables and symptoms of postpartum depression. Thus, we have investigated only a limited number of those factors that others have found to be of importance for postpartum mental health.

Moreover, there is an abundance of psychosocial factors that we have neglected to measure, which may nevertheless exert an influence on postpartum psychological well-being, e.g. self-confidence. All variables that may affect our outcome variables but that are not assessed and analyzed are potential sources of error that reduce the validity and generalizability of our results. However, with our limited sample size, there is a limit to how many variables we could have investigated with the statistical methods we used. Thus, our selection of variables reflects a compromise between our desire to carry out exploratory analyses and the need to retain methodological integrity.

Clinical Implications

Our participants' conspicuously low scores on measures of mental health, coupled with the fact that the majority of effects in our analyses were of limited size, make it natural to question the clinical importance of our findings. However, the majority of women do not experience clinical levels of anxiety or depression during pregnancy or in the postpartum period (O'Hara, 1987). Our results help to shed light on which factors may be of importance for the mental health of women who do not belong to high-risk groups. Furthermore, even mild symptoms of maternal psychopathology in the postpartum period increase the risk of insecure attachment and later psychopathology in children (Glasheen, Richardson, & Fabio, 2010; Moehler et al., 2006; Righetti-Veltema et al., 2003). Considering the potentially severe consequences of both mild and more serious depressive conditions for mothers, their children, and their families, it is clear that the prevention of postpartum depression may be enormously beneficial in terms of the health and well-being of those affected, as well as making good sense from a health economics perspective. Although primary prevention is an ideal, secondary prevention in terms of early identification and timely implementation of treatment for those women already suffering from depressive symptoms clearly has great value as well. Naturally, such goals will be more easily met if health professionals have a thorough

knowledge and understanding of the risk factors as well as of the symptoms of postpartum depression.

Norwegian municipalities are legally obligated to provide care for pregnant women and children (Forskrift om helsestasjons- og skolehelsetjeneste, 2003), and this care is usually provided by municipal well-baby clinics. Public health nurses and general practitioners at well-baby clinics are therefore ideally placed to carry out screening and preventative work. Not only do health professionals at well-baby clinics have the opportunity to reach virtually the entire population of new parents, but they can form long-term relationships with mothers and closely monitor their progress over time. However, public health nurses and other medical staff at well-baby clinics may not feel equipped or prepared to deal with maternal mental health issues. Indeed, research shows that up to 50 % of cases of postpartum depression may go undetected (Clay & Seehusen, 2004), and that a substantial proportion of health professionals fail to screen for or identify symptoms of postpartum depression at routine health visits due to perceived insufficient time and inadequate training or knowledge (Gjerdingen & Yawn, 2007; Olson et al., 2002). The problem is compounded by the fact that many women hide their symptoms and refrain from seeking help from professionals as well as from friends and family, often due to fear of stigmatization and a belief that professional help would not be of any use (McIntosh, 1993). Thus, it is vital that health professionals are trained to be proactive in the detection and management of symptoms of postpartum depression. Naturally, this is not possible unless researchers investigate and communicate knowledge of symptoms, causes, risk factors, and treatment options for postpartum mental health problems to clinical practitioners. The results of the current study contribute to an expanding body of knowledge within this field, and may thus be of relevance to the primary and secondary prevention of postpartum depression.

Although prenatal depression has been identified as a risk factor for postpartum depression (O'Hara & Swain, 1996; Robertson et al., 2004), the value of screening for prenatal depression in order to prospectively identify women who subsequently develop depressive illnesses has been called into question (Edwards et al., 2008). Our results indicate that prenatal anxiety is an important predictor of postpartum HADS-D scores, and that prenatal depression and prenatal anxiety scores together can significantly predict postpartum EPDS scores. Perhaps a broader approach to prenatal screening, checking for symptoms of both depression and anxiety, would be more successful in identifying at-risk women who could benefit from more frequent contact with health professionals or other interventions.

In this study, emotional support from friends and family tempered the adverse effects of higher levels of prenatal anxiety on women's postpartum HADS-D scores. Thus, we suggest that it is important to assess the quality of emotional support that is available to those women who exhibit elevated anxiety levels in pregnancy. We believe it would be appropriate to consider implementing specific interventions in cases where prenatal anxiety is present and emotional support is limited, for instance establishing support groups or offering more frequent contact with a public health nurse or other health professional who could provide a stable source of advice and support.

Our results indicate that instrumental support from friends and family may potentiate the adverse effects of elevated prenatal anxiety levels on women's postpartum HADS-D scores. Further research is needed in order to clarify the mechanisms through which this effect occurs. If self-efficacy is involved, as we have suggested, it might be useful to implement interventions designed to bolster self-efficacy as well as to help anxious mothers-to-be to interpret help from others in a more positive way.

Finally, our analyses indicate that women's postpartum HADS-D scores are lower when their partners' income level is higher. If this can be replicated, it could have

implications for detection and possibly for treatment. Clearly, one would also need to investigate the mechanisms underlying the association between income and symptoms of depression in order to develop appropriate interventions. For example, if the relationship is due to worry, anxiety-reducing interventions might be useful. In any case, we believe health professionals should be aware that family finances may be associated with postpartum mental health, and that it may be worthwhile to investigate women's financial situation and related problems or worries as part of prenatal health care. This might contribute to the identification of at-risk individuals, as well as facilitating early referral to appropriate agencies in cases where financial advice or help is needed.

Conclusion

This study showed that psychosocial variables assessed in pregnancy can be used to predict symptoms of depression three months postpartum in a community sample. Our findings support results from previous research showing that symptoms of prenatal psychopathology and degree of social support are among the most important risk factors for postpartum depression, and contribute to the understanding of how these risk factors can interact to affect postpartum mental health. Additionally, our analyses clearly indicate that women's psychological well-being in the postpartum period is affected by their partners' income level. Although prenatal screening for risk factors cannot prospectively identify all women who will develop postpartum depression, a thorough knowledge of the risk factors and an understanding of how these variables may affect women's mental health can be of great importance for health professionals who aim to provide the best possible care for pregnant women and new mothers. Such knowledge can facilitate early detection of possible cases of postpartum depression and may form the basis for the development and implementation of effective interventions. While there is a clear need for further research in

order to clarify the mechanisms involved, this study contributes to the expanding body of

knowledge concerning prenatal risk factors for postpartum depression.

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Table 1

Gross Annual Income for Participants and Their Partners

Income (NOK)	Women (%)	Partners (%)
No income	0.0	0.0
< 150,000	4.3	2.2
150,000 - 199,999	0.0	2.2
200,000 - 299,999	21.7	4.4
300,000 - 399,999	52.2	22.2
400,000 - 499,999	15.2	28.9
> 500,000	6.5	40.0

Table 2

Psychometric Properties of the Major Study Variables

Variable	*n*	*M*	*SD*	Range Potential	Range Actual
Age	46	29.11	4.84		19-41
Number of children	45	0.67	0.83		0-3
Emotional support	45	26.89	3.05	6-30	20-30
Instrumental support	46	6.61	1.58	2-10	3-9
Satisfaction with life	43	5.80	1.36	1-7	1-7
Self-esteem	43	3.30	0.36	1-4	2.75-4
Relationship satisfaction	41	5.38	0.62	1-6	3.20-6
Adverse life events	43	0.60	0.69	0-9	0-2
History of depression	43	1.49	1.87	0-6	0-6
Prenatal anxiety	46	4.47	2.91	0-21	0-13
Prenatal depression	46	2.41	2.37	0-21	0-10
EPDS	35	2.51	2.11	0-30	0-8
Postpartum HADS-D	43	1.56	1.69	0-21	0-6

Table 3

Internal Consistency of Measures

Measure	α	Mean inter-item correlation
Emotional support	.56	.21
Instrumental support	.67	.51
Satisfaction With Life Scale	.84	.57
Self-esteem	.79	.51
Relationship satisfaction	.90	.47
History of depression	.86	.52
Prenatal HADS-A	.73	.31
Prenatal HADS-D	.67	.25
EPDS	.70	.22
Postpartum HADS-D	.58	.22

Table 4

Tests of Normality

Variable	Kolmogorov-Smirnov test			Skewness		Kurtosis	
	D	df	p	Statistic	SE	Statistic	SE
Age	.10	46	.200	0.39	0.35	-0.04	0.69
Number of children	.32	45	.000	0.96	0.35	-0.04	0.70
Income	.27	46	.000	-0.52	0.35	1.94	0.69
Partner's income	.22	45	.000	-1.27	0.35	1.86	0.70
Emotional support	.20	45	.000	-0.73	0.35	-0.64	0.70
Instrumental support	.19	46	.000	-0.02	0.35	-0.65	0.69
Satisfaction with life	.17	46	.002	-1.27	0.35	3.53	0.69
Self-esteem	.25	46	.000	0.72	0.35	-0.24	0.69
Relationship satisfaction	.18	44	.001	-1.94	0.36	5.39	0.70
Adverse life events	.31	46	.000	0.66	0.35	-0.84	0.69
History of depression	.17	46	.002	0.48	0.35	-1.20	0.69
Prenatal anxiety	.13	46	.048	1.01	0.35	1.08	0.69
Prenatal depression	.20	46	.000	1.22	0.35	1.18	0.69
EPDS	.17	35	.014	0.59	0.40	-0.39	0.78
Postpartum HADS-D	.26	43	.000	1.30	0.36	0.93	0.71

Table 5

Differences in Age, Prenatal Depression Scores, and Prenatal Anxiety Scores Between Completers and Noncompleters

Variable	Completers		Noncompleters		t(53)	p[a]
	M	*SD*	*M*	*SD*		
Age	29.11	4.84	32.00	4.03	1.68	.099
Prenatal depression	2.41	2.37	1.56	1.33	-1.05	.300
Prenatal anxiety	4.47	2.91	4.91	3.84	0.39	.698

[a]Two-tailed.

Table 6

Correlations Between Variables

Variable	Postpartum HADS-D	EPDS
Age	.04	-.05
Number of children	.15	-.05
Income	-.02	.02
Partner's income	-.49**	-.19
Emotional support	-.35*	-.16
Instrumental support	.14	.20
Satisfaction with life	-.50**	-.20
Self-esteem	-.38*	-.30
Relationship satisfaction	-.16	.06
Adverse life events	.22	.19
History of depression	.12	.16
Prenatal anxiety	.45**	.41*
Prenatal depression	.34*	.40*

*p < 0.05. **p < 0.01

Table 7

Standard Multiple Regression of EPDS on Prenatal Anxiety and Prenatal Depression

Predictor	β	t	p
Prenatal anxiety	.28	1.60	.119
Prenatal depression	.26	1.49	.147

Note. β = standardized coefficients. R^2 = .221. *p* = .019.

Table 8

Standard Multiple Regression of Postpartum HADS-D on Partner's Income, Satisfaction With Life, Self-Esteem, Prenatal Anxiety, Emotional Support, and Prenatal Depression

Predictor	β	t	p
Partner's income	-.30	-2.10	.043
Satisfaction with life	-.19	-1.19	.243
Self-esteem	-.18	-1.25	.218
Prenatal anxiety	.15	0.94	.355
Emotional support	-.14	-0.97	.338
Prenatal depression	.05	0.36	.722

Note. β = standardized coefficients. R^2 = .446. *p* = .001.
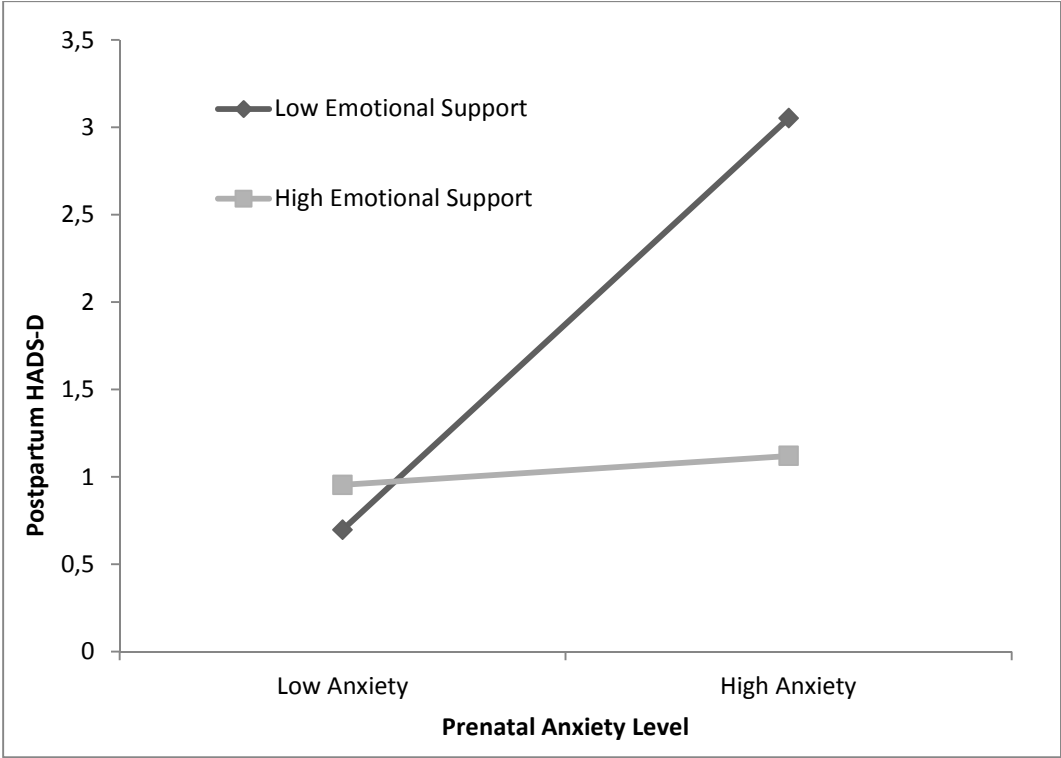
Figure 1. Postpartum depression symptom level as a function of prenatal anxiety level and degree of emotional support.
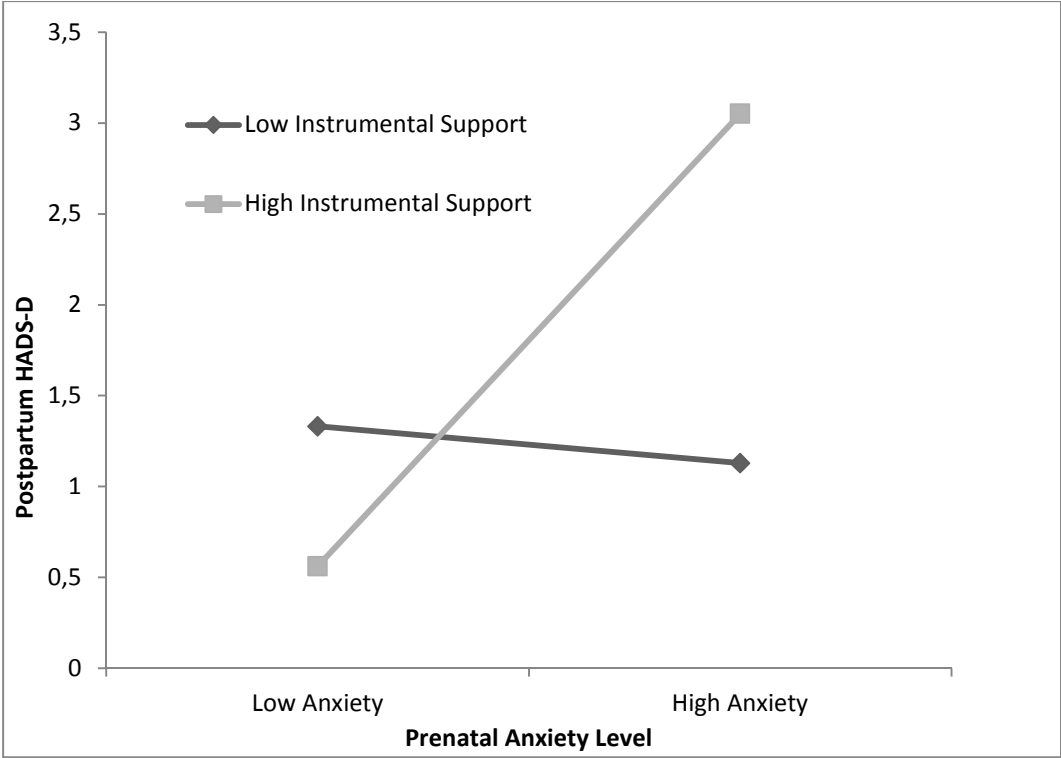
Figure 2. Postpartum depression symptom level as a function of prenatal anxiety level and degree of instrumental support.

Appendix

Questionnaire

"Kosthold, mental helse og spedbarns utvikling"

Your identity will be hidden

1) Personlig ID

┌──┐
│   │
└──┘

2) Hvem svarer på skjemaet

   O Mor
   O Far

3) Hvilken sivil status har du?

   O Gift
   O Samboer
   O Enslig
   O Skilt/separert
   O Enke
   O Annet

4) Hvor gammel er du?

┌──┐
│   │
└──┘

5) Hvor mange barn har du?

┌──┐
│   │
└──┘

6) Utdanningsnivå

   O 9-årig grunnskole
   O Videregående skole
   O Inntil 4 år høyskole/universitet
   O 4 år eller mer på høyskole/universitet

7) Arbeidssituasjon

O Heltidsarbeid, 80-100 %
O Deltidsarbeid, 50-79 %
O Deltidsarbeid, mindre enn 50 %
O Hjemmeværende
O Annet

8) Hva var brutto årsinntekt (før skatt) det siste året for deg?

O Ingen inntekt
O Under 150.000 kr
O 150-199.999 kr
O 200-299.999 kr
O 300-399.999 kr
O 400-499.999 kr
O Over 500.000 kr

9) Hva var brutto inntekt (før skatt) det siste året for din ektefelle/samboer/partner?

O Ingen inntekt
O Under 150.000 kr
O 150-199.999 kr
O 200-299.999 kr
O 300-399.999 kr
O 400-499.999 kr
O Over 500.000 kr
O Har ikke ektefelle/samboer/partner

Familie og venner

10) Min familie (foreldre og søsken)

	Helt enig	Delvis enig	Verken eller	Delvis uenig	Helt uenig
Jeg føler meg knyttet til familien min	O	O	O	O	O
Familien min legger vekt på mine meninger	O	O	O	O	O
Det forekommer at jeg føler meg utenfor, selv i familien	O	O	O	O	O

11) Jeg får praktisk hjelp og avlastning fra nære slektninger utenom ektefelle/samboer/partner

    O Ja, svært ofte
    O Ja, nokså ofte
    O Ja, av og til
    O Sjeldent
    O Nei, aldri

12) Dine nærmeste venner

	Helt enig	Delvis enig	Verken eller	Delvis uenig	Helt uenig
Jeg føler meg knyttet til vennene mine	O	O	O	O	O
Vennene mine legger vekt på mine meninger	O	O	O	O	O
Det forekommer at jeg føler meg utenfor, selv blant venner	O	O	O	O	O

13) Jeg får praktisk hjelp og avlastning fra venner?

    O Ja, svært ofte
    O Ja, nokså ofte
    O Ja, av og til
    O Sjeldent
    O Nei, aldri

14) Har du noen utenom ektefelle/samboer/partner som du kan søke råd hos i en vanskelig situasjon?

    O Nei
    O Ja, 1-2 personer
    O Ja, flere enn to personer

15) Kryss av om du er enig eller uenig i de følgende påstandene?

	Helt enig	Delvis enig	Verken eller	Delvis uenig	Helt uenig
På de fleste måter er livet mitt nær idealet mitt	O	O	O	O	O

Livsbetingelsene mine er svært gode	O	O	O	O	O
Jeg er fornøyd med livet mitt	O	O	O	O	O
Så langt har jeg oppnådd det som er viktig for meg i livet	O	O	O	O	O
Hadde jeg kunnet leve livet på nytt, ville jeg nesten ikke forandret noe	O	O	O	O	O

16) Hva slags oppfatning har du av deg selv?

	Svært enig	Enig	Uenig	Svært uenig
Jeg har en positiv holdning til meg selv	O	O	O	O
Jeg føler meg ubrukelig til tider	O	O	O	O
Jeg føler jeg ikke har mye å være stolt av	O	O	O	O
Jeg føler at jeg er en verdifull person, i alle fall på lik linje med andre	O	O	O	O

17) Dersom du lever i et parforhold hvor enig er du i disse beskrivelsene av ditt parforhold?

	Svært enig	Enig	Litt enig	Litt uenig	Uenig	Svært uenig
Det er et nært samhold mellom meg og min ektefelle/samboer/partner	O	O	O	O	O	O
Min partner og jeg har problemer i parforholdet	O	O	O	O	O	O
Jeg er svært lykkelig i mitt parforhold	O	O	O	O	O	O
Min partner er generelt forståelsesfull	O	O	O	O	O	O

Jeg tenker ofte på å avslutte vårt parforhold	O	O	O	O	O	O
Jeg er fornøyd med forholdet til min partner	O	O	O	O	O	O
Vi er ofte uenige om viktige avgjørelser	O	O	O	O	O	O
Jeg har vært heldig med valg av partner	O	O	O	O	O	O
Vi er enige om hvordan barn bør oppdras	O	O	O	O	O	O
Jeg tror min partner er fornøyd med forholdet	O	O	O	O	O	O

18) Har du i løpet av de siste 12 månedene opplevd noe av det følgende?

	Nei	Ja
Har du hatt problemer på arbeidsplassen eller der du utdanner deg	O	O
Har du hatt økonomiske problemer	O	O
Ble du skilt, separert eller avbrøt du samlivet	O	O
Har du hatt problemer eller konflikter med familie, venner eller naboer	O	O
Har du vært alvorlig syk eller skadet	O	O
Har en av dine nærmeste vært alvorlig syk eller skadet	O	O
Har du vært utsatt for alvorlig trafikkulykke, boligbrann eller grovt tyveri	O	O
Har du mistet en som stod deg nær	O	O
Annet	O	O

19) Hvis Ja, hvor vondt/vanskelig var dette for deg?

	Ikke så ille	Vanskelig /vondt	Veldig vanskelig/vondt
Problemer på arbeidsplassen eller der du utdanner deg	O	O	O
Økonomiske problemer	O	O	O
Skilt, separert eller avbrutt samliv	O	O	O
Konflikter med familie, venner eller naboer	O	O	O
Selv vært alvorlig syk eller skadet	O	O	O
En av dine nærmeste vært alvorlig syk eller skadet	O	O	O
Alvorlig trafikkulykke, boligbrann eller grovt tyveri	O	O	O
Mistet en som stod deg nær	O	O	O
Annet	O	O	O

Her kommer noen spørsmål om hvordan du føler deg. For hvert spørsmål markerer du ett av de fire svarene som best beskriver dine følelser den siste uken.
Ikke tenk for lenge på svaret – de spontane svarene er best.

20) Jeg føler meg nervøs og urolig

    O Mesteparten av tiden
    O Mye av tiden
    O Fra tid til annen
    O Ikke i det hele tatt

21) Jeg gleder meg fortsatt over tingene slik jeg pleide før

    O Avgjort like mye
    O Ikke fullt så mye
    O Bare lite grann
    O Ikke i det hele tatt

22) Jeg har en urofølelse som om noe forferdelig vil skje

    O Ja, og noe svært ille
    O Ja, ikke så veldig ille
    O Litt, bekymrer meg lite
    O Ikke i det hele tatt

23) Jeg kan le og se det morsomme i situasjoner

    O Like mye nå som før
    O Ikke like mye nå som før
    O Avgjort ikke som før
    O Ikke i det hele tatt

24) Jeg har hodet fullt av bekymringer

    O Veldig ofte
    O Ganske ofte
    O Av og til
    O En gang iblant

25) Jeg er i godt humør

    O Aldri
    O Noen ganger
    O Ganske ofte
    O For det meste

26) Jeg kan sitte i fred og ro og kjenne meg avslappet

    O Ja, helt klart
    O Vanligvis
    O Ikke så ofte
    O Ikke i det hele tatt

27) Jeg føler meg som om alt går langsommere

    O Nesten hele tiden
    O Svært ofte
    O Fra tid til annen
    O Ikke i det hele tatt

28) Jeg føler meg urolig som om jeg har sommerfugler i magen

    O Ikke i det hele tatt
    O Fra tid til annen
    O Ganske ofte
    O Svært ofte

29) Jeg bryr meg ikke om hvordan jeg ser ut

    O Ja, jeg har sluttet å bry meg
    O Ikke som jeg burde
    O Kan hende ikke nok
    O Bryr meg som før

30) Jeg er rastløs som om jeg stadig må være aktiv

    O Uten tvil svært mye
    O Ganske mye
    O Ikke så veldig mye
    O Ikke i det hele tatt

31) Jeg ser med glede frem til viktige hendelser og ting

    O Like mye som før
    O Heller mindre enn før
    O Avgjort mindre enn før
    O Nesten ikke i det hele tatt

32) Jeg kan plutselig få et anfall av panikk

    O Uten tvil svært ofte
    O Ganske ofte
    O Ikke så veldig ofte
    O Ikke i det hele tatt

33) Jeg kan glede meg over gode bøker, radio og TV

    O Ofte
    O Fra tid til annen
    O Ikke så ofte
    O Svært sjeldent

34) Har du noen ganger tidligere i livet i en sammenhengende periode på 2 uker eller mer:

	Nei	Ja
Følt deg deprimert, trist eller nedfor	O	O
Hatt problemer med matlysten eller spist for mye	O	O
Vært plaget av kraftløshet eller mangel på overskudd	O	O
Virkelig bebreidet deg selv og følt deg verdiløs	O	O
Hatt problemer med å konsentrere deg eller ta beslutninger	O	O
Hatt minst 3 av problemene over samtidig	O	O

35) Hvis du har hatt 3 av disse problemene samtidig, hvor mange uker varte den lengste perioden?

36) Var det noen spesiell grunn til dette?

O Nei, ingen spesiell grunn
O Ja (f.eks. dødsfall, skilsmisse, abort, ulykke)

Opplevelse av tilhørighet i nabolaget

37) Føler du tilhørighet til stedet du bor nå?

O I stor grad
O I noen grad
O I liten grad
O Ikke i det hele tatt

38) Hvor mange i nabolaget ditt stopper du med og tar en prat hvis du møter dem tilfeldig?

O Ingen
O 1
O 2
O 3-5
O Flere enn 5

39) Hvor mange familier / husstander i nabolaget ditt kjenner du så godt at du besøker dem av og til?

    O Ingen
    O 1
    O 2
    O 3-5
    O Flere enn 5

40) Hvor mange i nabolaget ditt regner du som nære venner?

    O Ingen
    O 1
    O 2
    O 3-5
    O Flere enn 5

41) Vet du omtrent hvor mange småbarnsfamilier som bor i nabolaget ditt?

    O 5 eller flere
    O 3 eller 4
    O 1 eller 2
    O Ingen
    O Vet ikke

Her vil vi gjerne vite hvordan sjømatinntaket ditt har vært i svangerskapet. Med sjømat mener vi fisk, fiskeprodukter og andre sjømatprodukter som for eksempel skjell og skalldyr. Vi er klare over at kostholdet varierer fra dag til dag. Prøv likevel så godt du kan å gi et "gjennomsnitt" av ditt sjømatinntak spist til middag, som pålegg eller som mellommåltid.

42) Hvor ofte bruker du fisk, fiskeprodukter eller annen sjømat som middagsmat?

    O Mer enn 5 ganger/uke
    O 3 ganger eller mer/uke
    O 1-2 ganger/uke
    O 1-3 ganger/måned
    O Sjeldnere enn 1 gang/måned
    O Aldri

43) Hvis du spiser fisk, fiskeprodukter eller annen sjømat til middag, hvor mye spiser du vanligvis? (1 porsjon = 150 gram, tilsvarer for eksempel 1 laksekotelett eller 3 fiskekaker eller 2 dl reker u/ skall)

O ½ porsjon eller mindre
O 1 porsjon
O 1 ½ porsjon
O 2 porsjoner
O 3 porsjoner

44) Hvor ofte bruker du sjømat som pålegg, i salat, mellommåltid, snacks eller lignende?

O Mer enn 5 ganger/uke
O 3-5 ganger/uke
O 1-2 ganger/uke
O 1-3 ganger/måned
O Sjelden
O Aldri

45) Hvis du bruker sjømat som pålegg, i salat, mellommåltid eller lignende, beskriv hvor mye du vanligvis spiser? (for eksempel boks makrell i tomat, antall fiskekaker, dl reker til antall brødskiver/knekkebrød)

46) Hvor ofte spiser du vanligvis følgende sjømat som middag?

	3 ganger eller mer/uke	1-2 ganger/uke	1-3 ganger/mnd	Sjeldnere enn 1 gang/mnd	Aldri
Laks, ørret	O	O	O	O	O
Makrell	O	O	O	O	O
Sild	O	O	O	O	O
Kveite	O	O	O	O	O
Uer	O	O	O	O	O
Steinbit	O	O	O	O	O
Flyndre, rødspette	O	O	O	O	O
Torsk	O	O	O	O	O
Sei	O	O	O	O	O
Hyse	O	O	O	O	O
Abbor, gjedde (ferskvann)	O	O	O	O	O
Røye, sik	O	O	O	O	O

(ferskvann)

	3 ganger eller mer/uke	1-2 ganger/uke	1-3 ganger/mnd	Sjeldnere enn 1 gang/mnd	Aldri
Reker	O	O	O	O	O
Krabbe	O	O	O	O	O
Hummer	O	O	O	O	O
Blåskjell	O	O	O	O	O
Kamskjell	O	O	O	O	O
Fiskekaker	O	O	O	O	O
Fiskeboller	O	O	O	O	O
Fiskepudding	O	O	O	O	O
Fiskegrateng	O	O	O	O	O
Fiskepinner	O	O	O	O	O
Fiskesuppe	O	O	O	O	O
Klippfisk	O	O	O	O	O

47) Hvor ofte spiser du vanligvis følgende sjømat som pålegg?

	3 ganger eller mer/uke	1-2 ganger/uke	1-3 ganger/mnd	Sjeldnere enn 1 gang/mnd	Aldri
Makrell i tomat	O	O	O	O	O
Sardin på boks	O	O	O	O	O
Brisling	O	O	O	O	O
Ansjos	O	O	O	O	O
Røkt laks, ørret	O	O	O	O	O
Gravet laks, ørret	O	O	O	O	O
Tunfisk på boks	O	O	O	O	O
Sild	O	O	O	O	O
Kaviar	O	O	O	O	O
Crabsticks	O	O	O	O	O
Svolværpostei	O	O	O	O	O
Lofotpostei	O	O	O	O	O
Annen sjømat	O	O	O	O	O

48) Dersom du spiser annen sjømat som pålegg vil vi gjerne at du spesifiserer det her:

49) Spiser du innmat av fisk?

O Ja
O Nei

50) Dersom ja, hvor mange ganger per år spiser du fiskeinnmat?

	1-3 ganger/år	4-6 ganger/år	7-9 ganger/år	10 ganger eller mer
Rogn	O	O	O	O
Fiskelever	O	O	O	O

Andre generelle spørsmål om kostholdet ditt

51) Hvor ofte spiser du frukt og grønnsaker?

	Flere ganger daglig	Hver dag	4-6 ganger/uke	1-3 ganger/uke	Sjelden	Aldri
Frukt	O	O	O	O	O	O
Grønnsaker	O	O	O	O	O	O

52) Spiser du meieriprodukter (melk, yoghurt, ost) daglig?

O Ja
O Nei (gå til 55)

53) Dersom ja, hvor mange ganger per dag spiser du meieriprodukter? (En gang er for eksempel ett glass melk eller en yoghurt eller ost til en skive brød)

O 1-3 ganger/dag
O 4-6 ganger/dag
O 7-9 ganger/dag
O >10 ganger/dag

54) Dersom ja: Når det finnes Vitamin D berikede varianter av de ulike meieriproduktene, hvor ofte velger du da disse?

O Alltid
O Som oftest
O Noen ganger
O Sjelden
O Aldri
O Vet ikke

55) Bruker du smør eller margarin?

O Ja
O Nei (gå til 61)

Fyll inn til hvor mange brødskiver/knekkebrød/rundstykker du vanligvis bruker smør/margarin per uke.

56) Margarin

57) Lettmargarin

58) Smør

59) Hvor mye smører du per brødskive/knekkebrød/rundstykke?
En porsjonspakning på 10-12 gram rekker til antall skiver/knekkebrød/rundstykker:

O 1   O 2   O 3   O 4   O 5

60) Når det finnes Vitamin D berikede varianter av smør eller margarin, hvor ofte velger du da disse?

O Alltid
O Som oftest
O Noen ganger
O Sjeldent
O Aldri
O Vet ikke

61) Angi hvilke type fett du bruker vanligvis til matlaging?

	Daglig	Ukentlig	Månedlig	Sjelden	Aldri
Margarin	O	O	O	O	O
Lettmargarin	O	O	O	O	O
Smør	O	O	O	O	O
Olje	O	O	O	O	O

62) Hvis du bruker oljer, hvilke type olje bruker du vanligvis (velg en eller to typer)?

Olivenolje
Soyaolje
Rapsolje
Solsikkeolje
Maisolje
Annen olje

63) Dersom du bruker en annen olje enn det som er alternativene ovenfor vil vi gjerne at du spesifiserer det her:

[ ]

64) Når det finnes Vitamin D berikede oljer, hvor ofte velger du da disse?

O Alltid
O Som oftest
O Noen ganger
O Sjelden
O Aldri
O Vet ikke

Kosttilskudd

65) Bruker du tran, fiskeolje eller omega-3 tilskudd (flytende eller som kapsler)?

	Ja, hele året	Ja, men bare om vinteren	Nei
Flytende	O	O	O
Kapsler	O	O	O

66) Dersom du tar tilskudd: Hvor ofte tar du tilskudd av tran, fiskeolje eller omega-3?

O Daglig
O 4-6 ganger/uke
O 1-3 ganger/uke
O 1-3 ganger/måned

67) Dersom du tar flytende tilskudd: Hvor mye tran, fiskeolje eller omega-3 tar du per gang?

   O 1 teskje (3 ml)
   O 1 barneskje (6 ml)
   O 1 spiseskje (11 ml)

68) Dersom du tar kapsler: Hvor mye tran, fiskeolje eller omega-3 tar du per gang?

   O 1-2 kapsler
   O 3-4 kapsler
   O 5 eller flere kapsler

69) Hvilke type tran eller fiskeolje/omega-3 tilskudd pleier du å bruke? (Sett ett eller to kryss)

   Møllers tran
   Møllers dobbel
   Triomar
   Eskimo omega-3
   Selolje
   Triomega
   VitOmega
   Sunkost Omega-3
   Eldorado
   Pikasol
   Friflyt
   Annet, spesifiser her

   [   ]

70) Bruker du annet kosttilskudd?

   O Ja
   O Nei (gå til 73)

71) Hvis ja, hvilke type kosttilskudd bruker du og hvor ofte?

	Daglig	4-6 ganger/uke	1-3 ganger/uke	1-3 ganger/mnd
Multivitaminer og mineraler	O	O	O	O
Jern	O	O	O	O

B-vitaminer	O	O	O	O
Kalsium og Vitamin D	O	O	O	O
Annet	O	O	O	O

72) Dersom du tar kosttilskudd spesifiser hvilket og hvor mye du tar hver gang

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Bosted og etnisitet

73) Er du av kaukasisk avstamning (har hvit hudfarge)?

O Ja
O Nei
O Vet ikke

74) Hvilket språk snakket dere i ditt barndomshjem?

O Norsk
O Annet, spesifiser her:

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75) Bor du mesteparten av året i Norge?

O Ja, Sør-Norge
O Ja, Midt-Norge
O Ja, Nord-Norge
O Nei, bor i et annet land
O Annet, spesifiser her:

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Solvaner

76) Hvor ofte har du tatt solarium i løpet av svangerskapet?

    O 1-2 ganger/uken
    O 2-3 ganger/mnd
    O 1 gang/mnd
    O Sjeldnere
    O Aldri

77) Hvor mange uker har du vært på badeferie (Norge eller utlandet) i løpet av svangerskapet?

    O 7 uker eller mer
    O 4-6 uker
    O 2-3 uker
    O 1 uke
    O Har ikke vært på badeferie

78) Hvor mange uker har du vært på fjellet i snø i løpet av svangerskapet?

    O 4 uker eller mer
    O 2-3 uker
    O 7-13 dager
    O 1-6 dager
    O Har ikke vært på fjellet i snø

79) Hvor mye utendørsaktivitet har du om sommeren (turer, hagearbeid, jobb)?

    O Ute nesten hele tiden
    O Ganske mye
    O Middels
    O Lite

Andre spørsmål

80) Hvor høy er du?

81) Hvor mye veier du?

Nå kommer et par spørsmål som <u>kun</u> gjelder for mor. Far kan gå til spørsmål 87.

82) Hvor mye veide du før du ble gravid?

83) Har du vært gravid tidligere?

O Ja
O Nei (gå til 87)

84) Antall svangerskap?

85) Antall levendefødte barn?

86) Fødselsdato barnet/barna

87) Røyker du?

O Ja
O Nei

88) Hvis ja, hvor mange sigaretter røyker du pr. dag?

89) Bruker du snus?

O Ja
O Nei

90) Hvis ja, hvor mange ganger pr. dag?

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91) Hvor ofte mosjonerer du i minst 20 minutter? (Går, jogger, sykler, svømmer, fotball, aerobic, styrketrening eller lignende)

O Hver dag
O 4-6 ganger/uke
O 2-3 ganger/uke
O 1 gang/uke
O Sjeldnere
O Aldri

92) Hvor stor vekt legger du på å ha et sunt kosthold?

O Svært stor
O Stor
O Middels
O Liten
O Svært liten

93) Er ditt kosthold representativt for resten av familien?

O Ja
O Nei

94) Spiser du vanligvis ett eller flere måltider sammen med familien?

O Ja
O Nei

95) Gjelder dette deg?

Jeg er vegetarianer
Jeg har diabetes
Jeg har matvareallergi
Jeg spiser ikke melprodukter
Jeg spiser ikke melkeprodukter
Jeg spiser ikke kjøtt
Jeg spiser ikke grønnsaker

96) Jeg bruker medisiner (spesifiser hvilke)

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